AUTOMATED LIFE CYCLE COST MODELS FOR ARMY WEAPON SYSTEMS

MAY 1969

HEADQUARTERS
U. S. ARMY WEAPONS COMMAND
ROCK ISLAND, ILLINOIS 61201

AUTOMATED LIFE CYCLE COST MODELS

FOR

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PREPARED BY

FREDERICK M. CHAKOUR

HEADQUARTERS, U. S. ARMY WEAPONS COMMAND
ROCK ISLAND, ILLINOIS
COST ANALYSIS OFFICE

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By F. M. Chakour
Chief, Cost Analysis Office
U. S. Army Weapons Command
Rock Island, Illinois

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SECTION I

INTRODUCTION

Introduction

The U. S. Army Weapons Command is continually required to conduct weapon system cost studies involving the determination of life cycle costs for several alternative courses of action. These alternatives may consist of several weapon systems, one weapon system with several quantities and/or time frames, or a combination of several weapons any many quantities and time frames per system.

In order to conduct such comprehensive cost studies efficiently and thoroughly, the Army Weapons Command, since 1965, has been developing and employing in its cost studies, various automated models and techniques.

This report is a compilation of five automated cost models which are presented in the reverse order of their development.

The WECOM Combat Vehicle Life Cycle Cost Model is presented first since it is the most highly developed and most flexible of the five. This model, which was developed in late 1968 for the TATAWS III Study, develops costs according to the three usual cost categories of Development, Investment, and Operating as well as according to the Budget Program categories of the Army Fiscal Code. The model consists of some 100 equations and approximately 110 elements or sets of input data, schedules and cost factors. The computer program is written in Fortran IV for the IBM 360/65 computer.

The second model presented is that employed in the MBT Secondary Armament Study during September of 1967. This model, which is also written in Fortran, consists of approximately 65 equations requiring about 110 elements of input data, cost factors and schedules. A distinguishing feature of this model, which develops costs according to the Army Fiscal Code Budget Program elements, is that it illustrates

one approach to the life cycle costing of ammunition simultaneously with the weapon costing.

The tank cost model developed for the TATAWS II Study in early 1967 is the third methodology presented. Like the MBT Secondary Armament Model, it develops costs according to Budget Program categories only. The computer program is written in Fortran and the model consists of 22 equations with 45 elements of input data, factors and schedules.

The last two models presented pertain to the life cycle costing of small arms weapons (i.e., rifles, machine guns and grenade launchers) together with their ammunition. These were developed and employed in conjunction with a comprehensive Small Arms Weapons Systems Study conducted during 1965 and 1966 called the SAWS.

The first of these two models presented (i.e., model number four in this report) is the more sophisticated of the two in that it develops costs by year rather than developing total costs for a multi-year time frame as is done in the last model presented in this report. Model number four also contains a cost sensitivity sub-routine which is not contained in any of the other models. This sub-routine is based upon partial differentiation of the total cost equations.

Each of the SAWS models consists of approximately four or five equations which simultaneously develop costs for systems (weapon and ammunition) being phased in as well as those being phased out of the army inventory.

Each of the five methodologies consists of the mathematical model and nomenclature. Some include samples of computer printouts, input data, resultant costs, derivations of pertinent relationships as well as some of the Fortran computer programs employed and other explanatory material.

Questions pertaining to these models and/or their use may be directed to the author at the U. S. Army Weapons Command, Rock Island, Illinois 61201 - (AMSWE-CPD).

SECTION II

WECOM COMBAT VEHICLE LIFE CYCLE COST MODEL
(FOR TATAWS III)

WECOM COMBAT VEHICLE LIFE CYCLE COST MODEL

(For TATAWS III Study)

1. This model is presented in six sections as follows:

   A. Cost Model Flow Chart and Cost Model.

   B. List of data names and definitions of factors, data and schedules which are inputs to equations (i.e., appearing on right side of cost equations).

   C. Listing of definitions of data names appearing on left side of equations.

   D. TATAWS III Chart of Accounts (annotated with cost model equation numbers and input data names).

   E. Listing of all data names in sequence consistent with the TATAWS III Chart of Accounts.

   F. Computer Printouts of FORTRAN Program and Costs.

2. Section A is the mathematical cost model and consists of some 90 equations and FORTRAN statements in the correct order required for computer computation. The last page of this section contains an explanation of the FORTRAN "IF Statement" which is used throughout the model to permit automatic decision-making on the part of the computer. These statements are used to decide whether or not to provide for the provisioning of Army Stock Fund and Selected Repair Parts as well as to overcome certain mathematical difficulties, such as division by zero or preventing the generation of undesireable negative numbers. Otherwise, the model is straightforward and simply consists of equations for the computation of cost elements as they appear in the Chart of Accounts sequence.

3. The contents of Sections B and C are self-explanatory. The Section B listing isolates, defines, and highlights all the elements

of information required as input to the model, while Section C defines each of the cost elements computed with cost equations.

4. Sections D and E serve to explain the relationship between the elements of the mathematical model and the TATAWS III Chart of Accounts. It is also intended that Section E (or a portion of it) will serve as the computer output format for the presentation of cost details which will serve as WECOM backup of the results summarized on the six forms required by ACSFOR.

5. Section F contains computer printouts of the FORTRAN program, listings of input and output data as well as printouts of three of the cost summary forms designed specifically for this study.

SECTION A

COST MODEL FLOW CHART

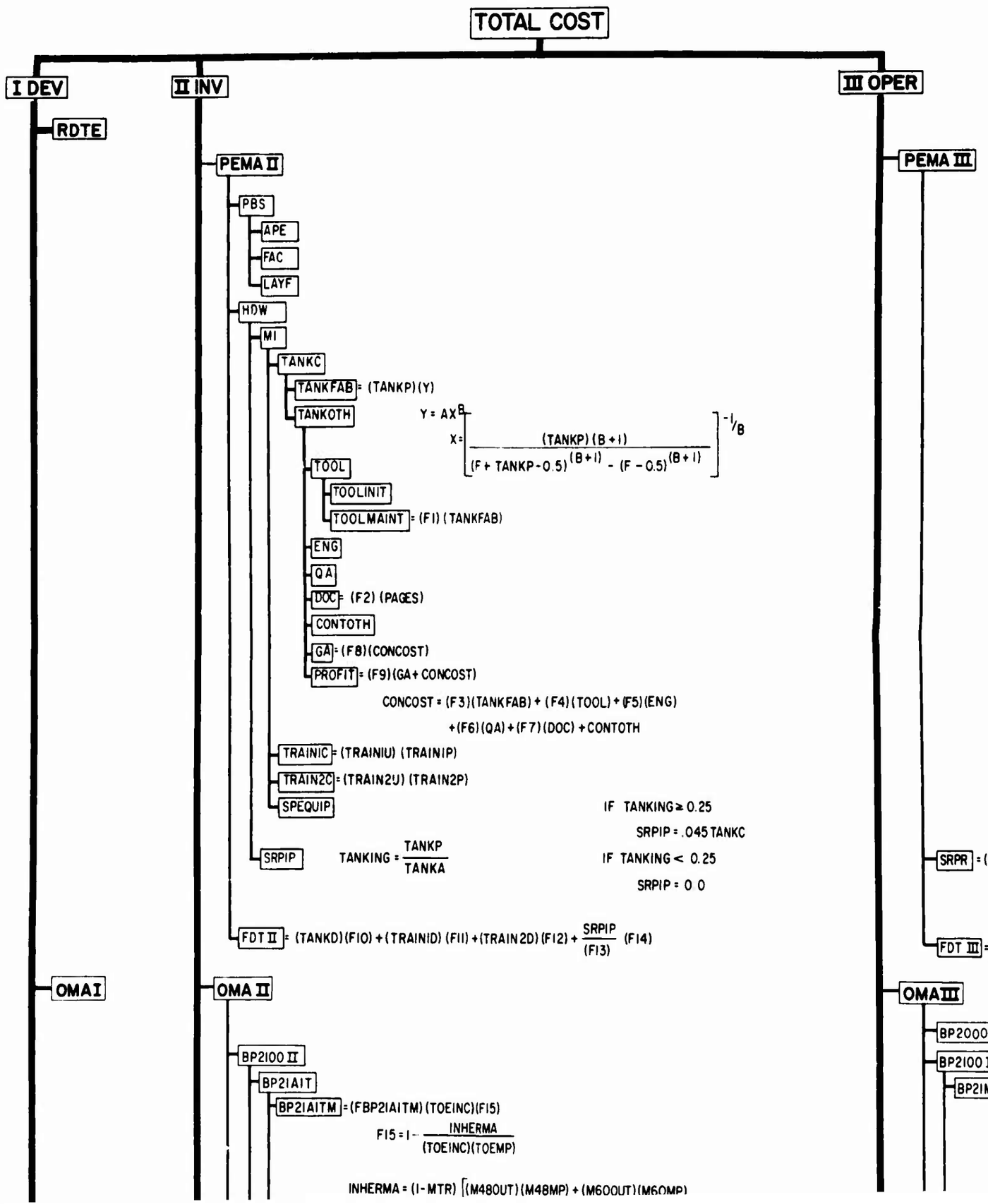
AND

EQUATIONS FOR TATAWS III

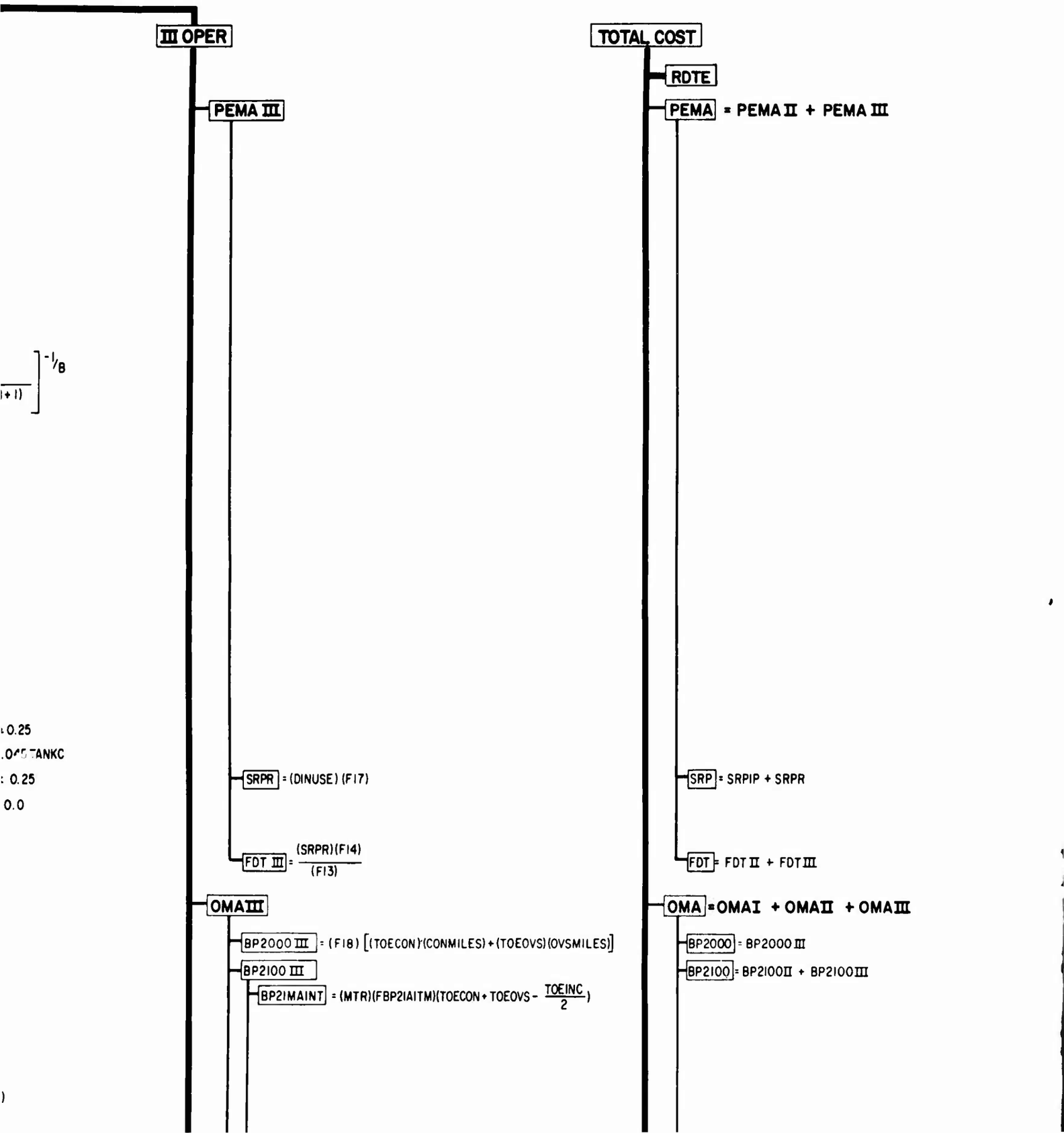
(In Correct Computational Order)

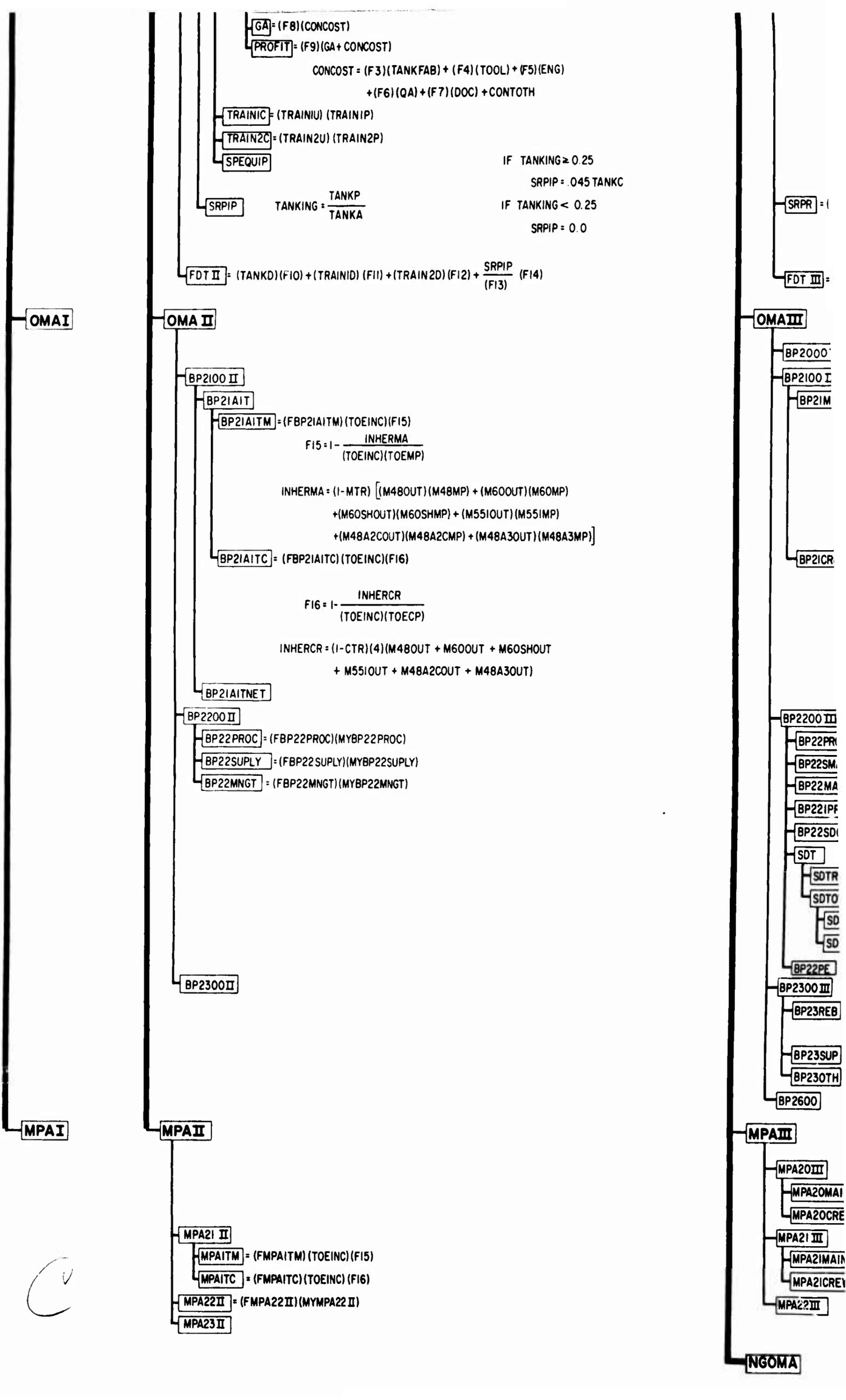
WECOM COMBA
LIFE CYCLE CO
FOR TATA

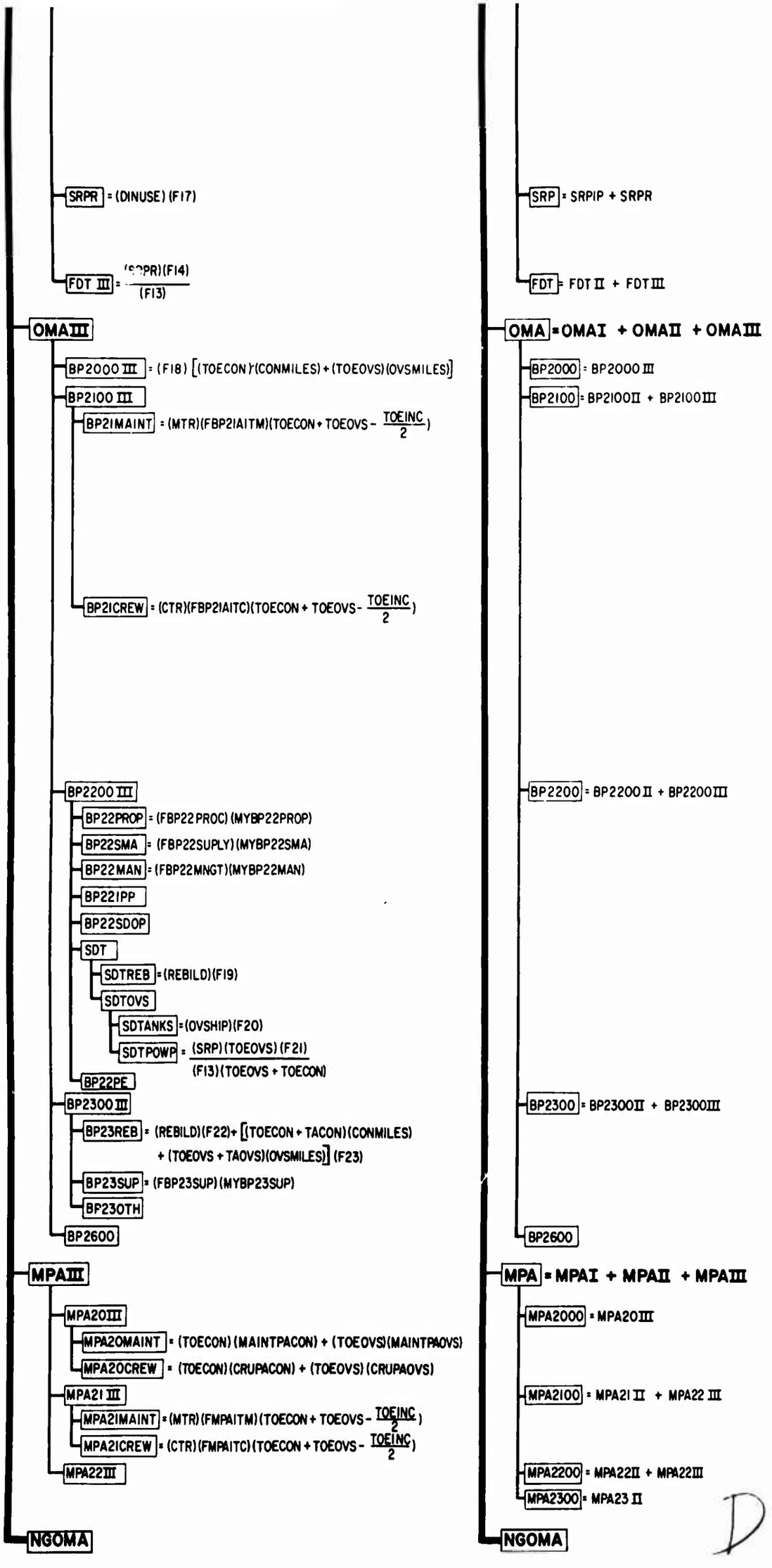
A



ECOM COMBAT VEHICLE LIFE CYCLE COST MODEL FOR TATAWS III




GA = (F8)(CONCOST)
PROFIT = (F9)(GA + CONCOST)
CONCOST = (F3)(TANKFAB) + (F4)(TOOL) + (F5)(ENG)
+(F6)(QA) + (F7)(DOC) + CONTOTH
TRAINIC = (TRAINIU)(TRAINIP)
TRAIN2C = (TRAIN2U)(TRAIN2P)
SPEQUIP
SRPIP
TANKING = TANKP / TANKA
IF TANKING ≥ 0.25
SRPIP = .045 TANKC
IF TANKING < 0.25
SRPIP = 0.0
FDT II = (TANKD)(F10) + (TRAINID)(F11) + (TRAIN2D)(F12) + SRPIP / (F13) (F14)
OMA I
OMA II
BP2100 II
BP21AIT
BP21AITM = (FBP21AITM)(TOEINC)(F15)
F15 = 1 - INHERMA / (TOEINC)(TOEMP)
INHERMA = (1-MTR) [(M48OUT)(M48MP) + (M60OUT)(M60MP)
+(M60SHOUT)(M60SHMP) + (M55IOUT)(M55IMP)
+(M48A2COUT)(M48A2CMP) + (M48A3OUT)(M48A3MP)]
BP21AITC = (FBP21AITC)(TOEINC)(F16)
F16 = 1 - INHERCR / (TOEINC)(TOECP)
INHERCR = (1-CTR)(4)(M48OUT + M60OUT + M60SHOUT
+ M55IOUT + M48A2COUT + M48A3OUT)
BP21AITNET
BP2200 II
BP22PROC = (FBP22PROC)(MYBP22PROC)
BP22SUPLY = (FBP22SUPLY)(MYBP22SUPLY)
BP22MNGT = (FBP22MNGT)(MYBP22MNGT)
BP2300 II
MPA I
MPA II
MPA21 II
MPAITM = (FMPAITM)(TOEINC)(F15)
MPAITC = (FMPAITC)(TOEINC)(F16)
MPA22 II = (FMPA22II)(MYMPA22II)
MPA23 II
SRPR = (
FDT III =
OMA III
BP2000
BP2100 I
BP21M
BP21CR
BP2200 III
BP22PR
BP22SM
BP22MA
BP22IPF
BP22SD
SDT
SDTR
SDTO
SD
SD
BP22PE
BP2300 III
BP23REB
BP23SUP
BP230TH
BP2600
MPA III
MPA20 III
MPA20MAI
MPA20CRE
MPA21 III
MPA21MAIN
MPA21CREW
MPA22 III
NGOMA


SRPR = (DINUSE) (F17)
FDT III = (SRPR)(F14) / (F13)
OMAIII
BP2000 III = (F18) [(TOECON)(CONMILES) + (TOEOVS)(OVSMILES)]
BP2100 III
BP21MAINT = (MTR)(FBP21AITM)(TOECON + TOEOVS - TOEINC/2)
BP21CREW = (CTR)(FBP21AITC)(TOECON + TOEOVS - TOEINC/2)
BP2200 III
BP22PROP = (FBP22PROC) (MYBP22PROP)
BP22SMA = (FBP22SUPLY) (MYBP22SMA)
BP22MAN = (FBP22MNGT) (MYBP22MAN)
BP221PP
BP22SDOP
SDT
SDTREB = (REBILD)(F19)
SDTOVS
SDTANKS = (OVSHIP)(F20)
SDTPOWP = (SRP)(TOEOVS)(F21) / (F13)(TOEOVS + TOECON)
BP22PE
BP2300 III
BP23REB = (REBILD)(F22) + [(TOECON + TACON)(CONMILES) + (TOEOVS + TAOVS)(OVSMILES)] (F23)
BP23SUP = (FBP23SUP) (MYBP23SUP)
BP23OTH
BP2600
MPAIII
MPA20III
MPA20MAINT = (TOECON) (MAINTPACON) + (TOEOVS)(MAINTPAOVS)
MPA20CREW = (TOECON) (CRUPACON) + (TOEOVS) (CRUPAOVS)
MPA21 III
MPA21MAINT = (MTR) (FMPAITM) (TOECON + TOEOVS - TOEINC/2)
MPA21CREW = (CTR) (FMPAITC) (TOECON + TOEOVS - TOEINC/2)
MPA22III
NGOMA
SRP = SRPIP + SRPR
FDT = FDT II + FDT III
OMA = OMAI + OMAII + OMAIII
BP2000 = BP2000 III
BP2100 = BP2100II + BP2100III
BP2200 = BP2200 II + BP2200III
BP2300 = BP2300II + BP2300III
BP2600
MPA = MPAI + MPAII + MPAIII
MPA2000 = MPA20III
MPA2100 = MPA21 II + MPA22 III
MPA2200 = MPA22II + MPA22III
MPA2300 = MPA23 II
NGOMA

F. M. Chakour
April 1969

EQUATIONS FOR TATAMS III

(In Correct Computational Order)

DEV = RDTE + MPAI + OMAI ---------- (1)

PBS = APE + FAC + LAYF ---------- (2)

TRAIN1C = (TRAIN1U) (TRAIN1P) ---------- (3)

TRAIN2C = (TRAIN2U) (TRAIN2P) ---------- (4)

IF (TANKP) 5, 5, 8

5 TANKC = 0 ---------- (5)

6 TANKU = 0 ---------- (6)

7 GO TO 20 ---------- (7)

Note 1:

The above IF statement procedure means that if TANKP is zero for any particular year, then TANKOTH (in equation 18) must also be zero for that same year. Hence, for any given year, this model does not provide for production support costs (i.e., TANKOTH) when there is no tank production programmed (TANKP).

Therefore, if production support costs are expected during a year in which TANKP is zero, such TANKOTH costs should be included in the following first year in which TANKP is not zero.

IF (B) 8, 9A, 8

8 $$X = \left[\frac{(TANKP)\ (B + 1)}{(F + TANKP - 0.5)^{(B + 1)} - (F - 0.5)^{(B + 1)}} \right]^{-\frac{1}{B}}$$ (8)

$$Y = AX^{B}$$ ---------- (9)

Y = A ---------- (9A)

TANKFAB = (TANKP) (Y) ---------- (10)

Note 1A:

If Government Furnished Equipment (GFE) is included in "A", then any GA and Profit contained in this GFE should be subtracted from the GFE before inclusion in A. In doing this, use the same factors for GA and Profit as are used for F8 and F9.

Note 1B:

If Government Furnished Equipment (GFE) contained in "TANKFAB" includes tool maintenance costs, then the basic F1 factor must be modified by multiplying by $\left(1 - \frac{\text{GFE Costs}}{\text{TANKFAB}}\right)$

TOOLMAINT = (F1) (TANKFAB) ---------- (11)

TOOL = TOOLINIT + TOOLMAINT ---------- (12)

DOC = (F2) (PAGES) ---------- (13)

CONTCOST = (F3) (TANKFAB) + (F4) (TOOL) + (F5) (ENG) + (F6) (QA) + (F7) (DOC)+ CONTOTH ---------- (14)

GA = (F8) (CONTCOST) ---------- (15)

PROFIT = (F9) (CONTCOST + GA) ---------- (16)

TANKOTH = TOOL + ENG + QA + DOC + CONTOTH + GA + PROFIT ---------- (17)

TANKC = TANKFAB + TANKOTH ---------- (18)

TANKU = TANKC/TANKP ---------- (19)

20 MI = TANKC + TRAIN1C + TRAIN2C + SPEQUIP ---------- (20)

IF (XSRPIP) 22, 22, 21

21 SRPIP = XSRPIP ---------- (21)

GO TO 26

22 IF (TANKA) 24, 24, 23 ---------- (22)

23 TANKINC = TANKP/TANKA ---------- (23)

IF (TANKINC - 0.25) 25, 24, 24

24 SRPIP = .045 (TANKC) ---------- (24)

GO TO 26

25 SRPIP = 0 ---------- (25)

26 HDW = MI + SRPIP ---------- (26)

27 FDTII = (TANKD) (F10) + (TRAIN1D) (F11) +

$$(TRAIN2D)\ (F12) + \frac{SRPIP}{(F13)}\ (F14) \text{ ---------- (27)}$$

Note 2:

F13 must always have a positive value greater than zero.

Note 3 - to persons using XSRPIP option:

If XSRPIP = 0 is desired for any year when TANKP/TANKA $\geq$ 0.25, then an input of $1.00 or less is required for XSRPIP for that year. The idea is that a very low value for XSRPIP should be used instead of zero, since an input of zero for XSRPIP (when TANKP/TANKA $\geq$ 0.25) will result in a large positive number for SRPIP.

PEMAII = PBS + HDW + FDTII ---------- (28)

IF (TOEINC) 29, 29, 31

29 F15 = 0 ---------- (29)

30 F16 = 0 ---------- (30)

GO TO 37

Note 4:

TOEINC can never be a negative number. If TOE tanks are decreased, let the input TOEINC = 0 for that particular year.

31 INHERMA = (1 - MTR) [(M48OUT) (M48MP) + (M60OUT) (M60MP) + (M60SHOUT) (M60SHMP) + (M551OUT) (M551MP) + (M48A2COUT) (M48A2CMP) + (M48A3OUT) (M48A3MP)] ----- (31)

INHERCR = (1 - CTR) (4) (M48OUT + M60OUT + M60SHOUT + M551OUT + M48A2COUT + M48A3OUT) ---------- (32)

$$F15 = 1 - \frac{INHERMA}{(TOEINC)\ (TOEMP)} \quad \text{---------- (33)}$$

IF (F15) 34, 35, 35

34 F15 = 0 ---------- (34)

$$35 \quad F16 = 1 - \frac{INHERCR}{(TOEINC)\ (TOECP)} \quad \text{---------- (35)}$$

IF (F16) 36, 37, 37

36 F16 = 0 ---------- (36)

Note 5:

The factors TOEMP and TOECP must always be numbers which are greater than zero.

---

37 BP21AITM = (FBP21AITM) (TOEINC) (F15) ---------- (37)

BP21AITC = (FBP21AITC) (TOEINC) (F16) ---------- (38)

BP21AIT = BP21AITM + BP21AITC ---------- (39)

BP2100II = BP21AIT + BP21NET ---------- (40)

BP22PROC = (FBP22PROC) (MYBP22PROC) ---------- (41)

BP22SUPLY = (FBP22SUPLY) (MYBP22SUPLY) ---------- (42)

```
      BP22MNGT = (FBP22MNGT) (MYBP22MNGT) ---------- (43)

      BP2200II = BP22PROC + BP22SUPLY + BP22MNGT ---------- (44)

      ------------------------------------

        OMAII = BP2100II + BP2200II + BP2300II ---------- (45)

      ------------------------------------

        MPAITM = (FMPAITM) (TOEINC) (F15) ---------- (46)

        MPAITC = (FMPAITC) (TOEINC) (F16) ---------- (47)

       MPA21II = MPAITM + MPAITC ---------- (48)

       MPA22II = (FMPA22II) (MYMPA22II) ---------- (49)

         MPAII = MPA21II + MPA22II + MPA23II ---------- (50)

      ------------------------------------

           INV = PEMAII + OMAII + MPAII ---------- (51)

      ------------------------------------

            IF (XASF)  53, 53, 52

52          ASF = XASF ---------- (52)

            GO TO 56

53          IF (SRPIP-1) 55, 55, 54 ---------- (53)

54          ASF = (0.105) (TANKC) ---------- (54)-(Non-Add)

            GO TO 56

55          ASF = 0 ---------- (55)
```

Note 6 - to persons using XASF option:

If it is desired to make XASF equal to zero while XSRPIP or SRPIP > 1 and while TANKC > zero, it is necessary to make XASF equal to $1.00 or less, but not zero.

Also, ASF is a non-add item and is shown only to indicate Initial Provisioning and Reprovisioning ASF requirements.

---

56 SRPR = (DINUSE) (F17) ---------- (56)

$$FDTIII = \frac{(SRPR)\ (F14)}{(F13)} \quad \text{---------- (57)}$$

PEMAIII = SRPR + FDTIII ---------- (58)

$$BP2000III = \left[(TOECON)\ (CONMILES) + (TOEOVS)\ (OVSMILES) \right] (F18) \text{-- (59)}$$

$$BP21MAINT = (MTR)\ (FBP21AITM)\ \left(TOECON + TOEOVS - \frac{TOEINC}{2}\right) \text{-------- (60)}$$

$$BP21CREW = (CTR)\ (FBP21AITC)\ \left(TOECON + TOEOVS - \frac{TOEINC}{2}\right) \text{-------- (61)}$$

BP2100III = BP21MAINT + BP21CREW ---------- (62)

BP22PROP = (FBP22PROC) (MYBP22PROP) ---------- (63)

BP22SMA = (FBP22SUPLY) (MYBP22SMA) ---------- (64)

BP22MAN = (FBP22MNGT) (MYBP22MAN) ---------- (65)

SDTREB = (REBILD) (F19) ---------- (66)

SDTANKS = (OVSHIP) (F20) ---------- (67)

SRP = SRPIP + SRPR ---------- (68)

IF (TOEOVS) 69, 69, 70

69 SDTPOWP = 0 ---------- (69)

GO TO 71

---

70 $$SDTPOWP = \frac{(SRP)\ (TOEOVS)\ (F21)}{(F13)\ (TOEOVS + TOECON)}$$ ---------- (70)

71 SDTOVS = SDTANKS + SDTPOWP ---------- (71)

SDT = SDTREB + SDTOVS ---------- (72)

BP2200III = BP22PROP + BP22PE + BP22IPP + BP22SDOP +
BP22SMA + SDT + BP22MAN ---------- (73)

BP23REB = (REBILD) (F22) + [(TOECON + TACON) (CONMILES) +
(TOEOVS + TAOVS) (OVSMILES)] (F23) ---------- (74)

BP23SUP = (FBP23SUP) (MYBP23SUP) ---------- (75)

BP2300III = BP23REB + BP23SUP + BP23OTH ---------- (76)

OMAIII = BP2000III + BP2100III + BP2200III +
BP2300III + BP2600 ---------- (77)

MPA20CREW = (TOECON) (CRUPACON) + (TOEOVS) (CRUPAOVS) ---------- (78)

MPA20MAINT = (TOECON) (MAINTPACON) + (TOEOVS) (MAINTPAOVS) ---------- (79)

MPA20III = MPA20CREW + MPA20MAINT ---------- (80)

$$MPA21CREW = (CTR)\ (FMPAITC)\ (TOECON + TOEOVS - \frac{TOEINC}{2}) \quad \text{---------- (81)}$$

$$MPA21MAINT = (MTR)\ (FMPAITM)\ (TOECON + TOEOVS - \frac{TOEINC}{2}) \quad \text{---------- (82)}$$

$$MPA21III = MPA21CREW + MPA21MAINT \quad \text{---------- (83)}$$

$$MPA22III = (FMPA22III)\ (MYMPA22III) \quad \text{---------- (84)}$$

$$MPAIII = MPA20III + MPA21III + MPA22III \quad \text{---------- (85)}$$

$$OPER = PEMAIII + OMAIII + NGOMA + MPAIII \quad \text{---------- (86)}$$

$$FDT = FDTII + FDTIII \quad \text{---------- (87)}$$

$$PEMA = PEMAII + PEMAIII \quad \text{---------- (88)}$$

$$OMA = OMAI + OMAII + OMAIII \quad \text{---------- (89)}$$

$$MPA = MPAI + MPAII + MPAIII \quad \text{---------- (90)}$$

$$TPC = MI + PBS + SRP + FDT \quad \text{---------- (91)}$$

$$TOTFM3 = RDTE + PEMA + OMA + NGOMA + MPA \quad \text{---------- (92)}$$

$$TOT = DEV + INV + OPER \quad \text{---------- (93)}$$

Explanation of IF Statement for TATAWS III Automated Model

IF Statement Number		
		(- 0 + are understood)
	IF (TANKP)	5, 5, 8
5	TANKC = 0 ----------	(5)
6	TANKU = 0 ----------	(6)
7	GO TO 20 ----------	(7)

The above IF statement is read as follows:

1. If the term in the brackets (in this case "TANKP") represents a negative number, then go to Equation 5 and from there proceed as usual in order of equation number sequence unless (or until) directed otherwise by a statement number.
2. Also, if the term in the brackets equals zero, go to Equation 5 and from there proceed as indicated in paragraph 1 above.
3. If, however, the term in the brackets represents a positive number, go to Equation 8 and from there proceed as indicated in paragraph 1 above.

Accordingly:

If TANKP is zero:

Equation 5 says "set TANKC = 0"

Equation 6 says "set TANKU = 0"

Equation 7 says "GO TO Equation 20 and calculate Total Major Item Hardware Costs", thus bypassing all equations concerned with production costs for tanks.

SECTION B

INPUT DATA AND DEFINITIONS

FOR TATAWS III MODEL

INPUT DATA AND DEFINITIONS FOR TATAWS III MODEL

Note: The following terms are listed in approximate order of appearance on right side of equations proceeding sequentially from equation 1 to 90.

Item No.	
1	RDTE - Yearly RDT&E costs
2	MPAI - Yearly MPA costs for Development Phase
3	OMAI - Yearly O&MA costs for Development Phase
4	APE - Yearly costs for Advanced Production Engineering
5	FAC - Yearly costs for production facilities
6	LAYF - Yearly facilities layaway costs
7	TRAIN1P - Production quantity of No. 1 trainers programmed yearly
8	TRAIN1U - Average yearly unit cost for trainer 1.
9	TRAIN1D - Delivery schedule for trainer 1.
10	TRAIN1A - Trainer 1 assets at end of each year
11	TRAIN2P)
12	TRAIN2U)---- These data names apply to trainer 2
13	TRAIN2D) as the above apply to trainer 1.
14	TRAIN2A)
15	TANKP) These apply to production, delivery and
16	TANKD)------ year end assets of the primary tank or
17	TANKA) vehicle under consideration.
18	AAOTANK)
19	AAOTRAIN1)-------- Army Acquisition Objectives for tank and trainers 1 and 2
20	AAOTRAIN2)

Item No.	
21	SPEQUIP - Yearly costs for Special Equipment, Ground Support Equipment, etc.
22	A - First unit mass production cost (Direct Labor, Material and Overhead)
23	B - Learning curve constant associated with slope of curve or with percentage rate of learning
24	F - Cumulative production quantity pertaining to the first unit of each year's tank production
25	TOOLINIT - Yearly Initial Tooling costs for tank production
26	ENG - Yearly Engineering costs associated with tank production
27	QA - Yearly Quality Assurance costs associated with tank production
28	PAGES - Yearly number of documentation pages to be developed for tank
29	CONTOTH - Other miscellaneous (yearly) tank production contractor costs
30	F1 - Factor to be applied to yearly tank fabrication costs to calculate yearly costs for maintenance of production tooling
31	F2 - Documentation costs per page
32	F3) Fractions of total costs for tank fabrication,
33	F4)--- tooling, engineering, quality assurance and
34	F5) documentation applicable to non-government production
35	F6) contractor, respectively.
36	F7)
37	F8 - Factor to be applied to yearly total contractor costs to determine General and Administrative costs
38	F9 - Profit percentage factor

Item NO.		
39	XSRPIP ------	Yearly thruput production costs for initial stockage of spare tank engines and transmissions (Selected Repair Parts for Initial Provisioning). X designates thruput alternative.
40 41 42	F10) F11)---- F12)	Average unit First Destination Transportation costs for tank, trainer 1 and trainer 2, respectively
43	F13 -	Average production cost for an engine and transmission set. F13 must always have a positive value greater than zero.
44	F14 -	Average First Destination Transportation cost for an engine-transmission set
	F15 and F16 are calculated with cost equations within the TATAWS III Model, (i.e., Equations 33 and 35).	
45	MTR - Maintenance Personnel Turnover Rate	
46	CTR - Crew Turnover Rate	
47 48 49 50 51 52	M48OUT) M48A2COUT) M48A3OUT) M60OUT) M60SHOUT) M551OUT)	-------- Yearly phase-out schedules for M48 Series, M60/M60A1 and M60 Shillelagh tanks as well as for the M551 Vehicle, respectively
53 54 55 56 57 58	M48MP) M48A2CMP) M48A3MP) M60MP) M60SHMP) M551MP)	------- Average number of maintenance personnel required per tank per year for organizational, direct, and general support
59	TOEINC - Yearly increase in TOE tanks (This must be zero or a positive value. If TOE tanks are decreased, then make TOEINC = 0.)	
60	TOEMP - Average number of maintenance personnel required per TOE tank per year for organizational, direct and general support. (This must always have a positive value and never be zero.)	

ITEM No.

61 TOECP - Average number of crew personnel required per TOE tank. (This must always be a positive value and never be zero.)

62 FBP21AITM - Tank maintenance training cost factor in $/tank (i.e., CONARC OM,A costs for Advanced Individual Training)

63 FBP21AITC - Tank crew training cost factor in $/tank (i.e., CONARC OM,A costs for Advanced Individual Training

64 BP21NET - Total yearly CONARC "New Equipment Training" OM,A costs. These costs are for travel of CONARC cadre.

65 FBP22PROC)
66 FBP22SUPLY)---- Factors (in $/man-yr) for Procurement, Supply and Management activities included in BP2200.
67 FBP22MNGT)

68 MYBP22PROC)
69 MYBP22SUPLY)--- Estimated total annual civilian Man-Years of effort required for Procurement, Supply and management activities under the Investment cost phase (i.e., Para II of TATAWS III Chart of Accounts).
70 MYBP22MNGT)

71 BP2300II - Yearly estimates of total costs for BP2300 activities under Investmant phase (Par II). Essentially, these costs are associated with New Equipment Training and New Materiel Introductory Briefings.

72 FMPAITM - Tank maintenance training cost factor in $/tank (i.e., CONARC MPA costs for cadre and trainees in Advanced Individual Training)

73 FMPAITC - Same as for FMPAITM above except this factor is for tank crew training in $/tank.

74 FMPA22II - Average MPA cost factor (in $/man yr) for BP2200 activities under Investment Phase II.

75 MYMPA22II - Estimated total annual Man-Years of military labor required for investment (Phase II) BP2200 activities

Item No.

76 MPA23II - Yearly estimates of total MPA costs for BP2300 activities under Investment Phase II. (This is essentially NET MPA costs.)

77 XASF - Annual estimates of total Army Stock Fund (Initial Provisioning Parts) costs (X indicates this estimate is calculated outside the model.) Also, this is a non-add cost element.

78 F17 - Average cost of SRPR "Selected Repair Parts for Replenishment" per tank year. These are replenishment spare engines and transmission costs.

79 DINUSE - Annual average total of TOE + TA tanks.

80 F18 - Average cost of ASF parts and POL per tank mile

81 TOECON - TOE tanks in CONUS (yearly average)

82 TOEOVS - TOE tanks overseas (yearly average)

83 CONMILES - Average miles per tank year in CONUS.

84 OVSMILES - Average miles per tank year overseas.

85 MYBP22PROP)
86 MYBP22SMA) --- Estimated total annual civilian man-years of effort for Procurement Operations, Supply Management and Project Management and Mid-Command Management activities under the Operating Cost Phase (i.e., Para III of TATAWS III Chart of Accounts)
87 MYBP22MAN)

88 REBILD - Rebuild schedule for tanks. Total number of tanks scheduled for overhaul and rebuild each year.

89 OVSHIP - Total number of tanks scheduled for overseas shipment each year

90 F19 - Average cost to ship a tank to and from a maintenance depot (worldwide average)

91 F20 - Average Second Destination Transportation costs (i.e., BP2250) for overseas shipment of a tank (worldwide average)

Item No.	
92	F21 - Average Second Destination Transportation costs per powerpack (i.e., per engine and transmission set)
93	F22 - Average cost of tank rebuild (exclusive of rebuild of powerpack)
94	F23 - Average cost of powerpack rebuild per tank mile
95	BP22PE - Total Production Engineering costs for ASF items (BP2270.2)
96	BP22IPP - Total Industrial Preparedness Planning cost (BP2240.3)
97	BP22SDOP - Total costs for Supply Depot Operations (i.e., costs to receive, store and ship hardware - BP2220.1)
98	FBP23SUP - Average cost for civilian labor expended in maintenance support activities in dollars per man-year
99	MYBP23SUP - Average yearly number of Man Years of civilian labor effort expended in maintenance support activities
100	BP230TH - Total yearly other depot maintenance costs exclusive of rebuild (23A0) and maintenance support (23L0) (i.e., total of BP23BP - BP23K0)
101	BP2600 - Total yearly OM,A costs for Army Reserve and ROTC
102	TACON - Number of TA tanks in continental United States (yearly average)
103	TAOVS - Number of TA tanks overseas (yearly average)
104	NGOMA - Yearly estimates of total costs for Operational and Maintenance of tanks in the National Guard under the Operating Cost Phase (III) of the TATAWS III Chart of Accounts
105 106	CRUPACON) CRUPAOVS) --- Average annual crew pay costs per TOE tank in CONUS and overseas, respectively, in $/tank year

Item No.		
107 108	MAINTPACON) MAINTPAOVS)	--- Average annual military labor costs for maintenance of one TOE tank in CONUS and overseas, respectively (exclusive of depot maintenance) in $/tank year
109	FMPA22III	- Average MPA cost per man-year associated with BP2200 activities under the Operating Cost Phase III of the TATAWS III Chart of Accounts
110	MYMPA22III	- Annual estimates of military man-years of effort associated with BP2200 activities under the Operating Cost Phase III of the TATAWS III Chart of Accounts

SECTION C

DEFINITIONS OF TATAWS III

COST ELEMENT DATA NAMES

(Terms appearing on left side of equations)

DEFINITIONS OF TATAWS III COST ELEMENT DATA NAMES

(Terms appearing on left side of equations)

Note: (1) Paragraph numbers refer to TATAWS III Chart of Accounts.

(2) All costs are on an annual basis unless otherwise indicated.

(3) The word "total" means "total annual".

Equa. No.	Cost Element Designation	Paragraph No.	Definitions
1	DEV	I	Total Research & Development Costs
2	PBS	II A 1	Total Production Base Support Costs
3	TRAIN1C	II A 2a (2)	Total Production Costs for Tank Trainer 1
4.	TRAIN2C	same	Total Production Costs for Tank Trainer 2
5.	TANKC	II A 2a (1)	Total Production Costs for Tanks
6.	TANKU	For II A 2a (1)	Average unit production costs for tanks.
7.	(This equation bypasses equations 8-19 if TANKP = 0.)		
8.	X	For II A 2a (1)	Learning curve midpoint of annual tank production quantity. This is the tank which has a unit cost equal to the annual average unit cost.
9.	Y	For II A 2a (1)	Unit cost of the X (or midpoint) tank
10.	TANKFAB	For II A 2a (1)	Total tank fabrication costs - (This includes material, labor and overhead but not production support II A2a(4).
11.	TOOLMAINT	For II A 2a(4)(a)	Costs for maintenance of tooling for tank production
12.	TOOL	IIA 2a (4)(a)	Total tool maintenance costs for tank production
13.	DOC	IIA 2a (4)(d)	Total tank documentation costs
14.	CONTCOST	For IIA 2a (4)(e)	Total tank production contractor costs
15.	GA	IIA 2a (4)(e)	General and Administrative overhead costs for tank production contractor
16.	PROFIT	IIA 2a (4) (e)	Tank production contractor's profit

17.	TANKOTH	IIA 2a (4)	Tank production support costs
18.	TANKC	IIA 2a (1)	Total tank production costs
19.	TANKU	For ACSFOR Forms	Average unit tank production cost
20.	MI	IIA 2a	Total major items hardware production costs
21.	SRPIP	IIA 2b	Selected Repair Parts for Initial Provisioning and Reprovisioning (i.e., spare engines and transmissions)
22.	TANKA	For ACSFOR Forms	(See next item.)
23.	TANKINC	For IIA 2b	Ratio of tank production programmed quantity (TANKP) to year end tank assets (TANKA)
24.) 25.)	- SRPIP	(----See Item 21 above.----)	
26.	HDW	IIA 2	Total hardware production costs
27.	FDTII	IIA 3	First Destination Transportation costs under Investment Phase
28.	PEMAII	IIA	Total PEMA for Investment Phase
29.	F15	For II B 1 and II C 2	Factor for inheritance of trained military personnel for tank maintenance (i.e., percentage of required military maintenance personnel which must undergo CONARC advanced individual training)
30.	F16	(Same as Item 29 except F16 pertains to CONARC training of Tank Crews)	
31.	INHERMA	For II B 1 and II B 2	Total number of tank maintenance personnel inherited from phaseout of other tanks.
32.	INHERCR	(Same as Item 31 except that this refers to tank crew personnel)	
33.) 34.)	- F15	(----See Item 29 above.----)	
35.) 36.)	- F16	(----See Item 30 above.----)	
37	BP21AITM	For II B 1	Total initial CONARC OM,A costs for Advanced Individual Training of tank maintenance personnel (Investment Phase)

38.	BP21AITC	(Same as 37 (BPalAITM) except this refers to tank crews.)	
39.	BP21AIT	For II B 1	Sum of Items 37 and 38
40.	BP2100II	II B 1	Total initial CONARC OM,A costs applicable to tank
41.	BP22PROC	IIB 2(a)(b)(d))	Total Investment Phase BP2200 "Central Supply Activities" costs for Procurement, Supply and Management, respectively
42.	BP22SUPLY	IIB 2(c))--	
43.	BP22MNGT	IIB 2(e)(f))	
44.	BP2200II	IIB 2	Total Investment Phase BP2200 costs (i.e., sum of items 41, 42 and 43 above)
45.	OMAII	IIB	Total OM,A costs for Investment Phase
46.	MPAITM	For IIC 2	Total initial CONARC MPA costs for Advanced Individual Training of Tank Maintenance Personnel (both cadre and trainee costs) for Investment Phase)
47.	MPAITC	(Same as for Item 46 above except pertains to tank crew.)	
48.	MPA21II	IIC 2	Total initial CONARC MPA costs for Advanced Individual Training of tank crews and maintenance personnel under Investment Phase (Sum of Items 46 and 47 above).
49.	MPA22II	IIC 1	Total initial MPA costs (Investment Phase) associated with BP2200 activities
50.	MPAII	IIC	Total MPA costs for Investment Phase
51.	INV	II	Total Investment Costs
52.	ASF	IID	Total acquisition costs of initial provisioning repair parts (Army Stock Fund) for Tanks. This is a non-add item.
53.	SRPIP	(See item 21 above.)	
54.) 55.)	- ASF	(See item 52 above.)	
56.	SRPR	For III A	Total production costs for replenishment of spare engines and transmissions (i.e., Selected Repair Parts for Replenishment)

57.	FDTIII	For III A	Total First Destination Transportation costs for SRPR
58.	PEMAIII	III A	Total PEMA costs for Operating Phase (i.e., Phase III)
59.	BP2000III	III B 1	Total cost of repair parts and POL for TOE tanks
60.	BP21MAINT	For III B 2	Total CONARC OM,A costs for replacement training of tank maintenance personnel
61.	BP21CREW	(Same as for Item 60 above except this cost refers to replacement training of tank crews.)	
62.	BP2100III	III B 2	Total BP2100 costs under Operating Phase III. (Sum of Items 60 and 61.)
63.	BP22PROP	III B 3(a))	Total Operating Phase (III) BP2200
64.	BP22SMA	III B 3(e)) --	"Central Supply Activities" costs
65.	BP22MAN	III B 3(g),(h))	for Procurement, Supply and Management, respectively
66.	SDTREB	For IIIB 3(f)(1)	Total transportation costs for tanks to and from maintenance depots, worldwide (i.e, Second Destination Transportation for rebuild and overhaul of tanks)
67.	SDTANKS	For IIIB 3(f)(2)	Total Second Destination Transportation costs for shipment of tanks overseas
68.	SRP	For ACSFOR Forms	Total costs of Selected Repair Parts (spare/repair engines and transmissions) (Sum of SRPR + SRPIP)
69.) 70.)	- SDTPOWP	For IIIB 3(f)(2)	Total Second Destination Transportation costs for power packs (engine/transmission set) being shipped overseas)
71.	SDTOVS	IIIB 3(f)(2)	Sum of items 67 and 69/70 above. Total of Second Destination Transportation costs for overseas shipments.
72.	SDT	IIIB 3(f)	Total Second Destination Transportation costs (Sum of items 66 and 71 above)
73.	BP2200III	III B 3	Total Operating Phase BP2200 costs

74.	BP23REB	III B 4a	Total costs for rebuild and overhaul of tanks at maintenance depots
75.	BP23SUP	III B 41	Total maintenance support costs for tanks at depots
76.	BP2300III	III B 4	Total Depot Maintenance Costs (BP2300) under Phase III (Operating Costs)
77.	OMAIII	III B	Total OM,A costs under Phase III (Operating Cost)
78.	MPA20CREW	For IIID	Total MPA costs for TOE tank crews associated with BP2000 (OM,A of Operating Forces)
79.	MPA20MAINT	(Same as for Item 78 above except these costs pertain to MPA costs for tank maintenance personnel)	
80.	MPA20III	For III D	Total MPA costs for TOE tank crews and maintenance personnel associated with BP2000 (OM,A of Operating Forces)
81.	MPA21CREW	For III D	Total CONARC MPA costs for replacement training of tank crews (costs include CONARC cadre as well as crew trainee MPA)
82.	MPA21MAINT	(Same as Item 81 above except this refers to replacement training of tank maintenance personnel)	
83.	MPA21III	For III D	Total MPA costs for CONARC replacement training of tank crews and maintenance personnel. (Sum of Items 81 and 82 above.)
84.	MPA22III	For III D	Total MPA costs associated with BP2200, Operating Phase III for tank "Central Supply Activities"
85.	MPAIII	III D	Total MPA costs associated with the Operations Phase III. (Sum of Items 80, 83 and 84 above.)
86.	OPER	III	Total Operating Costs (Phase III) (Sum of items 58, 77, 85 and National Guard OM,A)
87.	FDT	For ACSFOR Forms	Total First Destination Transportation costs. (Sum of items 27 and 57.)
88.	PEMA	For ACSFOR Forms	Total PEMA costs (Sum of Items 28 and 58.)

89.	OMA	For ACSFOR Forms	Total OM,A costs (Sum of items 45, 77 and OM,A costs under the Development Phase I.)
90.	MPA	For ACSFOR Forms	Total MPA costs (Sum of items 50, 85 and MPA costs under the Development Phase I.)
91.	TPC	For ACSFOR Forms	Total PEMA cost (yearly)
92.	TOTFM3	For ACSFOR Forms	Total of Budget Program Cost Elements (yearly)
93.	TOT	For ACSFOR Forms	Total of Development, Investment and Operating Costs (yearly)

SECTION D

LIFE CYCLE CHART OF ACCOUNTS

TATAWS III

LIFE CYCLE CHART OF ACCOUNTS

TATAWS III

	Appropriation Symbol	Project or AMS Code
I. RESEARCH AND DEVELOPMENT PHASE - (1)		
A. RDT&E - (RDTE)	21X2040	
1. Design and Development		
2. Test and Evaluation		
3. New Equipment Training		
B. MILITARY PERSONNEL, ARMY - (MPAI)	2182010	
1. Project Manager Staff		
2. New Equipment Training(includes CONARC instructor's time plus command personnel).		
C. OPERATION & MAINTENANCE ARMY - (OMAI)	2182020	
1. Special Tactical Activities		2050
2. Procurement Activities		2210.1
3. Pre-Issue Engineering		23L0.1
II. INVESTMENT PHASE - (51)		
A. PEMA - (28)	21X2030	
1. Production Base Support - (2)		4200,4490, 4900
a. APE - (APE)		4200,4490, 4931
b. Provisioning of Industrial Facilities - (FAC)		4200,4490, 4910
c. Layaway of Industrial Facilities - (LAYF)		4200,4490, 4920

Life Cycle Chart of Accts TATAMS III
(cont'd)

	Appropriation Symbol	Project or AMS Code
2. Hardware - (26)		
a. Major Items - (20)		(4200,4S00, (4400
(1) Main weapon system, ammo and missile (18) = (10) + (17) AAO		
(2) Trainers - (3) and (4)		
(3) Special equipment/ground equipment - (SPEQUIP)		
(4) Support costs - (17)		
(a) Tooling (12) = (11) + (TOOLINIT)		
(b) Engineering - (ENG)		
(c) Quality Assurance - (QA)		
(d) Documentation - (13)		
(e) Other - (15) and (16)		
b. Selected Repair Parts - (21), (24) or (25)		(4450, 4460, (4300
(1) Initial Provisioning		
(2) Reprovisioning		
3. First Destination Transportation - (27)		
B. Operation & Maintenance, Army - (45)	2182020	
1. Training Activities (40) = (37) + (38) + (BP21NET)		2100
a. School Training		
(1) Operation of Schools		
(2) Equipment for Schools		

Life Cycle Chart of Accts TATAMS III
(cont'd)

	Appropriation Symbol	Project or AMS Code
2. Central Supply Activities - (44)		2200
a. Procurement operations)) --(41)		2210.1
b. Contract Administration)		2210.2
c. Supply Management Activities - (42)		2230.1 & 2230.2
d. Procurement Standardization - (41)		2270.3
e. Project Manager - (43)		2280.3
f. Mid-Management Command - (43)		2280.1
3. Depot Materiel Maint. and Support Act. - (BP2300II)		2300
a. New Equipment Training		23LO
b. New Materiel Introductory Briefing		23LO
C. MILITARY PERSONNEL ARMY - (50)	2182010	
1. Project Managers - (49)		
2. Schools (48) = (46) + (47)		
a. Cadre		
b. Trainees (initial crews)		
3. New Equipment Training - (MPA23II)		
D. Army Stock Fund (memo entry only) - (52), (54) or (55)	21X4991.XXX	
1. Initial Provisioning		0700.1
2. Reprovisioning		0700.1
III. OPERATING PHASE - (86)		
A. PEMA - (58)		
1. Selected Repair Parts - (56)		(4300,4450,
First Destination Transportation - (57)		(4460
a. Replenishment		
2. Annual Service Practice Firings		4200,4800
B. Operation & Maintenance Army - (77)		
1. Operating Forces - (59)		2000

Life Cycle Chart of Accts TATAWS III
(cont'd)

	Appropriation Symbol	Project or AMS Code
a. Repair Parts		
b. POL		
c. Other (common maintenance equipment)		
2. Training Activities (62) = (60) + (61)		2100
a. Schools		
(1) Cadre(instructing replacement personnel)		
(2) Trainees (replacement crews)		
b. Repair parts		
c. POL		
3. Central Supply Activities - (73)		2200
a. Procurement Operations - (63)		2210.1
b. Production Engineering for ASF Items - (BP22PE)		2270.2
c. Industrial Preparedness Planning - (BP22IPP)		2240.3
d. Operation of Supply Depot Operations - (BP22SDOP)		2220.1
e. Supply Management Activities - (64)		2230
f. Transportation - (72)		2250
(1) CONUS (in connection with rebuild) - (66)		
(2) Overseas(includes port handling,ocean transportation and O/S inland transportation for items from production. Also could include some rebuild transportation O/S). (71) = (67) + (70)		
g. Project Manager Offices)		2280.3
h. Mid-Management Command)--(BP22MAN)		2280.1
4. Depot Maintenance & Maintenance Support - (76)		2300
a. Overhaul - (74)		23AO

Life Cycle Chart of Accts TATAWS III
(cont'd)

		Appropriation Symbol	Project or AMS Code
b. Progressive Maintenance	)		23B0
c. Conversion	)		23C0
d. Activation	)		23D0
e. Inactivation	)		23E0
f. Renovation	)		23F0
g. Analytical Rework	) -- (BP230TH)		23G0
h. Modification	)		23H0
i. Repair	)		23I0
j. Inspection & Test	)		23J0
k. Materiel Support	)		23K0
l. Maintenance Support - (75)			23L0
5. Army Reserve and ROTC - (BP2600)			2600
C. Operation and Maintenance, National Guard - (NGOMA)		2182065	
1. Training Operations			3710
2. Logistic Support			3730
3. Headquarters & Command Support			3740
D. Military Personnel, Army - (85)		2182010	
1. Project Manager - (84)			
2. Cadre (instructor's training replacement personnel)	)		
3. Trainees (replacement crews and direct and maintenance personnel)	) -- (83) = (81) + (82)		

SECTION E

RECONCILIATION OF DATA NAMES TO MATH MODEL AND CHART OF ACCOUNTS

RECONCILIATION OF DATA NAMES TO
MATHEMATICAL COST MODEL AND CHART OF ACCOUNTS
(TATAWS III)

Para Numbers from Chart of Accounts (Section D)	Data Name	Equation Number	Thruput
I	DEV	1	
A	RDTE		X
B	MPAI		X
C	OMAI		X
II	INV	51	
A	PEMAII	28	
1	PBS	2	
a	APE		X
b	FAC		X
c	LAYF		X
II A 2	HDW	26	
a	MI	20	
(1)	TANKC	18	
(a)	TANKFAB	10	
	TANKP		X
	Y	9	
	A		X
	B		X
	X	8	
	F		X
II A 2 a (2)	TRAIN1C	3	
	TRAIN1U		X
	TRAIN1P		X
	TRAIN2C	4	
	TRAIN2U		X
	TRAIN2P		X

Para Numbers from Chart of Accts (Sec D)		Data Name	Equation Number	Thruput
II A 2 a (3)		SPEQUIP		X
(4)		TANKOTH	17	
	(a)	TOOL	12	
		TOOLINIT		X
		TOOLMAINT	11	
		F1		X
	(b)	ENG		X
	(c)	QA		X
	(d)	DOC	13	
		F2		X
		PAGES		X
	(e)	GA	15	
		F8		X
		CONTCOST	14	
		F3		X
		F4		X
		F5		X
		F6		X
		F7		X
		CONTOTH		X
	(e)	PROFIT	16	
		F9		X
II A 2 b		XSRPIP		X
b		SRPIP	24 or 25	
		TANKINC	23	
		TANKA		X
A 3		FDTII	27	
		TANKD		X
		TRAIN1D		X
		TRAIN2D		X
		F10		X
		F11		X
		F12		X
		F13		X
		F14		X

Para Numbers from Chart of Accts (Sec D)	Data Name	Equation Number	Thruput
II B	OMAII	45	
1	BP2100II	40	
	BP21NET		X
	BP21AIT	39	
	BP21AITM	37	
	FBP21AITM		X
	TOEINC		X
	F15	33	
	TOEMP		X
	INHERMA	31	
	MTR		X
	M48OUT		X
	M48A2COUT		X
	M48A3OUT		X
	M60OUT		X
	M60SHOUT		X
	M551OUT		X
	M48MP		X
	M48A2CMP		X
	M48A3MP		X
	M60MP		X
	M60SHMP		X
	M551MP		X
	BP21AITC	38	
	FBP21AITC		X
	F16	35	
	TOECP		X
	INHERCR	32	
	CTR		X
II B 2	BP2200II	44	
a, b, d	BP22PROC	41	
	FBP22PROC		X
	MYBP22PROC		X
c	BP22SUPLY	42	
	FBP22SUPLY		X
	MYBP22SUPLY		X
e, f	BP22MNGT	43	
	FBP22MNGT		X
	MYBP22MNGT		X

Para Numbers from Chart of Accts (Sec D)	Data Name	Equation Number	Thruput
II B 3	BP2300II		X
II C	MPAII	50	
1	MPA22II	49	
	FMPA22II		X
	MYMPA22II		X
II C 2	MPA21II	48	
	MPAITM	46	
	FMPAITM		X
	MPAITC	47	
	FMPAITC		X
II C 3	MPA23II		X
II D	XASF		X
	ASF	52, 54 or 55	
III	OPER	86	
A	PEMAIII	58	
1	SRPR	56	
	DINUSE		X
	F17		X
1	FDTIII	57	
	F13		X
	F14		X
III B	OMAIII	77	
1	BP20000III	59	
	TOECON		X
	TOEOVS		X
	CONMILES		X
	OVSMILES		X
	F18		X
III B 2	BP2100III	62	
	BP21MAINT	60	
	BP21CREW	61	

Para Numbers from Chart of Accts (Sec D)	Data Name	Equation Number	Thruput
III B 3	BP2200III	73	
a	BP22PROP	63	
	MYBP22PROP		X
b	BP22PE		X
c	BP22IPP		X
d	BPSDOP		X
e	BP22SMA	64	
	MYBP22SMA		X
f	SDT	72	
	SDTREB	66	
	REBILD		X
	Fly		X
	SDTOVS	71	
	SDTANKS	67	
	OVSHIP		X
	F20		X
	SDTPOWP	69 or 70	
	SRP	68	
	F21		X
g & h	BP22MAN	65	
	MYBP22MAN		X
III B 4	BP2300III	76	
b - k	BP230TH		X
a	BP23REB	74	
	F22		X
1	BP23SUP	75	
	FBP23SUP		X
	MYBP23SUP		X
III B 5	BP2600		X
III C	NGOMA		X
III D	MPAIII	85	
1	MPA20III	80	
	MPA20CREW	78	
	CRUPACON		X
	CRUPAOVS		X
	MPA20MAINT	79	
	MAINTPACON		X
	MAINTPAOVS		X

Para Numbers from Chart of Accts (Sec D)	Data Name	Equation Number	Thruput
III D 2	MPA21III	83	
	MPA21CREW	81	
	MPA21MAINT	82	
III D 3	MPA22III	84	
	FMPA22III		X
	MYMPA22III		X

END OF EQUATIONS REQUIRED FOR CHART OF ACCOUNTS

INPUTS AND EQUATIONS REQUIRED FOR ACSFOR FORMS

FDT	87	
PEMA	88	
OMA	89	
MPA	90	
TANKU	19	
TRAIN1A		X
TRAIN2A		X

SECTION F

COMPUTER PROGRAM

AND

COMPUTER PRINTOUTS

```
    $JOB 'BLOUGH',KP=29,LINES=60,TIME=60
 1        IMPLICIT REAL*8 (A-H), REAL*8 (O-Z)
 2        INTEGER ALPHA(4)/'A.','B.','C.','D.'/
 3        DIMENSION XIN(111,17),NAMEIN(111,3),OUT(82,17),NAMOUT (62,3),NYEAR
         1(11),SYMBOL(111),TOTIN(111),TOTOUT(82),TOTEM3(17),SBV(3,7,10),DIFF
         2(7,11),XDIF(3,4,20),STOR(3,4,20),SAVE(3,6,20),YDIF(3,6,20),TOCOMP(
         313),FMT(20)
 4        DO 886 I = 1,3
 5        DO 886 J = 1,6
 6        DO 886 K = 1,20
 7        YDIF(I,J,K) = 0.0
 8      886 SAVE(I,J,K) = 0.0
 9        DO 887 I = 1,7
10        DO 887 J = 1,10
11      887 DIFF(I,J) = 0.0
12        DO 888 I = 1,3
13        DO 888 J = 1,4
14        DO 888 K = 1,20
15        XDIF(I,J,K) = 0.0
16      888 STOR(I,J,K) = 0.0
17        DO 889 I = 1,3
18        DO 889 J = 1,7
19        DO 889 K = 1,10
20      889 SBV(I,J,K) = 0.0
21        FYEAR = 1970
22        DO 1  I = 1,11
23        1 NYEAR(I) = FYEAR + I - 1
24          READ   2, ((NAMOUT (I,J),J = 1,3),I = 1,72)
25          READ    2, ((NAMOUT (I,J) ,J = 1,3),I = 76,81)
26        2 FORMAT (8(2A4,A2))
27          READ   3, ((NAMEIN(I,J),J=1,3),SYMBOL(I),I=1,110)
28        3 FORMAT (4(2A4,A3,3X,A1,5X))
29          READ (5,830)  FMT
30      830 FORMAT (20A4)
31          READ 4,NOMIXS,NOVEH
32        4 FORMAT (I1,8X,I1)
33          DO 315 JJJ = 1,NOMIXS
34          READ 6,MIX
35        6 FORMAT (A4)
36          DO 246 JJ = 1,NOVEH
37          DO 884 I = 1,13
38      884 TOCOMP(I) = 0.0
39          DO 885 I = 1,111
40          DO 885 J = 1,17
41      885 XIN(I,J) = 0.0
42          READ 7 , VEH,NOY
43        7 FORMAT (A1,8X,I2)
44          IF (NOY .EQ. 0) NOY = 11
45          PRINT 8888,VEH,NOY
46     8888 FORMAT (1H1,'VEHICLE NO.'3X,A1/1X,'NO. OF YEARS '3X,I4)
47          DO 9 I = 1,81
48          DO 9 J = 1,17
49        9 OUT(I,J) = 0.0
50          DO 21 I = 1,110
51          KSAVE = 0
52          READ (5,FMT,ERR=700) IFLAG,(XIN(I,K),K=1,NOY)
53          KSAVE = I + 1
54          IF (IFLAG)16,21,16
55       16 DO 23 J = 2,NOY
56          IF (XIN(I,J)) 23,20,23
```

```
      20 XIN(I,J) = XIN(I,J-1)
      23 CONTINUE
      21 CONTINUE
         DO 98 J = 1,NOY
         OUT(1,J) = XIN(1,J) + XIN(2,J) + XIN(3,J)
         OUT(2,J) = XIN(4,J) + XIN(5,J) + XIN(6,J)
         OUT(3,J) = XIN(7,J)*XIN(8,J)
         OUT(4,J) = XIN(11,J)*XIN(12,J)
         IF (XIN(15,J))5,5,8
       5 OUT(5,J) = 0.0
         OUT(6,J) = 0.0
         GO TO 30
       8 IF (XIN(23,J) .EQ. 0.0 ) GO TO 28
         OUT(76,J) = (XIN(15,J)*(XIN(23,J)+1.)/((XIN(24,J)+XIN(15,J)-.5 )**
        1(XIN(23,J)+1.)-(XIN(24,J)-.5)**(XIN(23,J)+1.)))**(-1./XIN(23,J))
         IOUT = OUT(76,J) + .5
         OUT(76,J) = IOUT
         OUT(71,J) = XIN(22,J)*OUT(76,J)**XIN(23,J)
         GO TO 29
      28 OUT(71,J) = XIN(22,J)
      29 OUT(7,J) = XIN(15,J)*OUT(71,J)
         OUT(8,J) = XIN(30,J)*OUT(7,J)
         OUT(9,J) = XIN(25,J) + OUT(8,J)
         OUT(10,J) = XIN(31,J)*XIN(28,J)
         OUT(11,J) = XIN(32,J)*OUT(7,J) + XIN(33,J)*OUT(9,J) + XIN(34,J)*XI
        1N(26,J) + XIN(35,J)*XIN(27,J) + XIN(36,J)*OUT(10,J) + XIN(29,J)
         OUT(12,J) = XIN(37,J)*OUT(11,J)
         OUT(13,J) = XIN(38,J)*(OUT(11,J) + OUT(12,J))
         OUT(14,J) = OUT(9,J) + XIN(26,J) + XIN(27,J) + OUT(10,J) + XIN(29,
        1J) + OUT(12,J) + OUT(13,J)
         OUT(5,J) = OUT(7,J) + OUT(14,J)
         OUT(6,J) = OUT(5,J)/XIN(15,J)
      30 OUT(15,J) = OUT(5,J) + OUT(3,J) + OUT(4,J)+ XIN(21,J)
         IF (XIN(39,J)) 32,32,31
      31 OUT(16,J) = XIN(39,J)
         GO TO 36
      32 CONTINUE
         IF (XIN(17,J)) 34,34,33
      33 OUT(77,J) = XIN(15,J)/XIN(17,J)
         IF (OUT(77,J) - .25) 35,34,34
      34 OUT(16,J) = .045*OUT(5,J)
         GO TO 36
      35 OUT(16,J) = 0.0
      36 OUT(17,J) = OUT(15,J) + OUT(16,J)
         OUT(18,J) = XIN(16,J)*XIN(40,J) + XIN(9,J)*XIN(41,J) + XIN(13,J)*X
        1IN(42,J) + OUT(16,J)*XIN(44,J)/XIN(43,J)
         OUT(19,J) = OUT(2,J) + OUT(17,J) + OUT(18,J)
         IF (XIN(59,J)) 39,39,41
      39 OUT(78,J) = 0.0
         OUT(79,J) = 0.0
         GO TO 47
      41  OUT(80,J) = (1. - XIN(45,J))*(XIN(47,J)*XIN(53,J) + XIN(50,J)*XIN
        1(56,J) + XIN(51,J)*XIN(57,J) + XIN(52,J)*XIN(58,J) + XIN(48,J)*XIN
        2(54,J) + XIN(49,J)*XIN(55,J))
         OUT(81,J) = (1. - XIN(46,J))*4.0*(XIN(47,J) + XIN(50,J) + XIN(51,J
        1) + XIN(52,J) + XIN(48,J) + XIN(49,J))
         OUT(78,J) =  1. -(OUT(80,J) /(XIN(59,J)*XIN(60,J)))
         IF (OUT(78,J)) 44,45,45
      44 OUT(78,J) = 0.0
      45 OUT(79,J) = 1. -(OUT(81,J)/(XIN(59,J)*XIN(61,J)))
```

```
      IF (OUT(79,J)) 46,47,47
   46 OUT(79,J) = 0.0
   47 OUT(20,J) = XIN(62,J)*XIN(59,J)*OUT(78,J)
      OUT(21,J) = XIN(63,J)*XIN(59,J)*OUT(79,J)
      OUT(22,J) = OUT(20,J) + OUT(21,J)
      OUT(23,J) = OUT(22,J) + XIN(64,J)
      OUT(24,J) = XIN(65,J)*XIN(68,J)
      OUT(25,J) = XIN(66,J)*XIN(69,J)
      OUT(26,J) = XIN(67,J)*XIN(70,J)
      OUT(27,J) = OUT(24,J) + OUT(25,J) + OUT(26,J)
      OUT(28,J) = OUT(23,J) + OUT(27,J) + XIN(71,J)
      OUT(29,J) = XIN(72,J)*XIN(59,J)*OUT(78,J)
      OUT(30,J) = XIN(73,J)*XIN(59,J)*OUT(79,J)
      OUT(31,J) = OUT(29,J) + OUT(30,J)
      OUT(32,J) = XIN(74,J)*XIN(75,J)
      OUT(33,J) = OUT(31,J) + OUT(32,J) + XIN(76,J)
      OUT(34,J) = OUT(19,J) + OUT(28,J) + OUT(33,J)
      IF (XIN(77,J)) 63,63,62
   62 OUT(35,J) = XIN(77,J)
      GO TO 66
   63 IF (OUT(16,J)-1.) 65,65,64
   64 OUT (35,J) = .105*OUT(5,J)
      GO TO 66
   65 OUT(35,J) = 0.0
   66 OUT(36,J) = XIN(79,J)*XIN(78,J)
      OUT(37,J) = OUT(36,J)*XIN(44,J)/XIN(43,J)
      OUT(38,J) = OUT(36,J) + OUT(37,J)
      OUT(39,J) =(XIN(81,J)*XIN(83,J) + XIN(82,J)*XIN(84,J))*XIN(80,J)
      ITOE2 = XIN(59,J)/2.
      OUT(40,J) = XIN(45,J)*XIN(62,4)*(XIN(81,J)+XIN(82,J)-ITOE2)
      OUT(41,J) = XIN(46,J)*XIN(63,J)*(XIN(81,J)+XIN(82,J)-ITOE2)
      OUT(42,J) = OUT(40,J) + OUT(41,J)
      OUT(43,J) = XIN(65,J)*XIN(85,J)
      OUT(44,J) = XIN(66,J)*XIN(86,J)
      OUT(45,J) = XIN(67,J)*XIN(87,J)
      OUT(46,J) = XIN(88,J)*XIN(90,J)
      OUT(47,J) = XIN(89,J)*XIN(91,J)
      OUT(48,J) = OUT(16,J) + OUT(36,J)
      IF (XIN(82,J))79,79,80
   79 OUT(49,J) = 0.0
      GO TO 81
   80 OUT(49,J) = OUT(48,J)*XIN(82,J)*XIN(92,J)/(XIN(43,J)*(XIN(82,J) +
     1XIN(81,J)))
   81 OUT(50,J) = OUT(47,J) + OUT(49,J)
      OUT(51,J) = OUT(46,J) + OUT(50,J)
      OUT(52,J) = OUT(43,J) + XIN(95,J) + XIN(96,J) + XIN(97,J) + OUT(44
     1,J) + OUT(51,J) + OUT(45,J)
      OUT(53,J) = XIN(88,J)*XIN(93,J) +((XIN(81,J) + XIN(102,J))*XIN(83,
     1J) + (XIN(82,J) + XIN(103,J))*XIN(84,J))*XIN(94,J)
      OUT(54,J) = XIN(98,J)*XIN(99,J)
      OUT(55,J) = OUT(53,J) + OUT(54,J) + XIN(100,J)
      OUT(56,J) = OUT(39,J)+OUT(42,J)+OUT(52,J)+OUT(55,J)+XIN(101,J)
      OUT(57,J) = XIN(81,J)*XIN(105,J) + XIN(82,J)*XIN(106,J)
      OUT(58,J) = XIN(81,J)*XIN(107,J) + XIN(82,J)*XIN(108,J)
      OUT(59,J) = OUT(57,J) + OUT(58,J)
      OUT(60,J) = XIN(46,J)*XIN(73,J)*(XIN(81,J)+XIN(82,J)-ITOE2)
      OUT(61,J) = XIN(45,J)*XIN(72,J)*(XIN(81,J)+XIN(82,J)-ITOE2)
      OUT(62,J) = OUT(60,J) + OUT(61,J)
      OUT(63,J) = XIN(109,J)*XIN(110,J)
      OUT(64,J) = OUT(59,J) + OUT(62,J) + OUT(63,J)
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      OUT(65,J) = OUT(38,J) + OUT(56,J) + XIN(104,J) + OUT(64,J)
      OUT(66,J) = OUT(18,J) + OUT(37,J)
      OUT(67,J) = OUT(19,J) + OUT(38,J)
      OUT(68,J) = XIN(3,J) + OUT(28,J) + OUT(56,J)
      OUT(69,J) = XIN(2,J) + OUT(33,J) + OUT(64,J)
      OUT(70,J) = OUT(1,J) + OUT(34,J) + OUT(65,J)
      OUT(72,J) = OUT(5,J) + OUT(3,J) + OUT(4,J) + OUT(2,J) + OUT(48,J)
     1+ OUT(66,J) + XIN(21 ,J)
      TOTFM3(J)= XIN(1,J) + OUT(67,J) + OUT(68,J) +XIN(104,J)+OUT(69,J)
      STOR(JJJ,1,J) = STOR(JJJ,1,J) + OUT(1,J)
      STOR(JJJ,2,J) = STOR(JJJ,2,J) + OUT(34,J)
      STOR(JJJ,3,J) = STOR(JJJ,3,J) + OUT(65,J)
      STOR(JJJ,4,J) = STOR(JJJ,4,J) + OUT(70,J)
      SAVE(JJJ,1,J) = SAVE(JJJ,1,J)+ XIN(1,J)
      SAVE(JJJ,2,J) = SAVE(JJJ,2,J)+  OUT(67,J)
      SAVE(JJJ,3,J) = SAVE(JJJ,3,J)+ OUT(68,J)
      SAVE(JJJ,4,J) = SAVE(JJJ,4,J)+ XIN(104,J)
      SAVE(JJJ,5,J) = SAVE(JJJ,5,J)+ OUT(69,J)
      SAVE(JJJ,6,J) = SAVE(JJJ,6,J)+TOTFM3(J)
   98 CONTINUE
  101 NN = 1
      NNN = 55
      DO 115 LL = 1,2
      PRINT 100,VEH,MIX,(NYEAR(K),K=1,11)
  100 FORMAT (1H1,T4,A1,1X,A4,T58'INPUT DATA'//1X,T6'ITEM/FY'T26,I4,10(6
     1X,I4)/)
      DO 109 I = NN,NNN
  109 PRINT    110, I,(NAMEIN(I,J),J=1,3),SYMBOL(I),(XIN(I,K),K=1,11)
  110 FORMAT (1X,I3,2X,2A4,A3,1X,A1,11F10.2)
      NN = 56
  115 NNN = 110
      IF (JJ .NE. 1) GO TO 410
      WRITE(6,400)
  400 FORMAT (1H1, 'INPUT DATA')
      DO 402 I = 1,110
  402 PRINT 403, (NAMEIN(I,J),J=1,3),(XIN(I,K),K=1,11)
  403 FORMAT (1X,2A4,A3,1X,11F10.0)
  410 IF (NOY .LE. 11) GO TO 119
      WRITE (6,5555)
 5555 FORMAT (1H1, 'COMPLETION DATA' )
      DO 776 I = 1,110
  776 PRINT 777,(NAMEIN(I,J),J=1,3),(XIN(I,K),K=12,NOY)
  777 FORMAT (1H0,2A4,A3,1X,6(F14.5,5X))
  119 NN = 1
      NNN = 55
      DO 128 LL = 1,2
      PRINT 120,VEH,MIX,(NYEAR(K),K=1,11)
  120 FORMAT (1H1,T4,A1,1X,A4,T65,'OUTPUT DATA'/1X,T56,'COSTS IN THOUSAN
     1DS OF DOLLARS'/T6,'ITEM/FY'T26,I4,10(6X,I4)/)
C     DIVIDE OUTPUT VALUES BY 1000.
      DO 123 I = NN,NNN
      DO 122 J = 1,NOY
  122 OUT(I,J) = OUT(I,J)/1000.
  123 PRINT 125, I,(NAMOUT (I,J),J=1,3), (OUT(I,K),K=1,11)
  125 FORMAT (1X,I3,2X,2A4,A3,2X,11F10.2)
      NN = 56
  128 NNN = 72
C     DIVIDE ROTE,MPAI,UMAI,LGOMA,TRAIN1U,TRAIN2U,AND SPEQUIP BY 1000.
      DO 130 I = 1,3
      DO 130 J = 1,NOY
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      130 XIN(1,J) = XIN(1,J)/1000.
          DO 131 J = 1,NOY
          XIN(104,J) = XIN(104,J)/1000.
          XIN(8,J) = XIN(8,J)/1000.
          XIN(12,J) = XIN(12,J)/1000.
      131 XIN(21,J) = XIN(21,J)/1000.
          IF (NOY .LE. 11) GO TO 134
          DO 99 I = 12,NOY
          TOCOMP(1) = TOCOMP(1) + XIN(15,I)
          TOCOMP(2) = TOCOMP(2) + OUT(72,I)
          TOCOMP(3) = TOCOMP(3) + OUT(34,I)
          TOCOMP(4) = TOCOMP(4) + OUT(65,I)
          TOCOMP(5) = TOCOMP(5) + OUT(67,I)
          TOCOMP(6) = TOCOMP(6) + OUT(68,I)
          TOCOMP(7) = TOCOMP(7) + OUT(69,I)
          TOCOMP(8) = TOCOMP(8) + OUT(5,I)
          TOCOMP(9) = TOCOMP(9) + XIN(7,I)
          TOCOMP(10) = TOCOMP(10) + OUT(3,I)
          TOCOMP(11) = TOCOMP(11) + XIN(11,I)
          TOCOMP(12) = TOCOMP(12) + OUT(4,I)
       99 TOCOMP(13) = TOCOMP(13) + XIN(21,I)
      134 CONTINUE
          PRINT   135, (NYEAR(K),K = 1,11)
      135 FORMAT (1HO,T58,'OUTPUT DATA'/1X,T47,'COSTS/QUANTITIES IN DOLLARS/
         1UNITS' /1X,T6'ITEM/FY',T26,I4,10(6X,I4)/)
          DO 138 I = 76,81
          J = I-3
      138 PRINT 125, J,(NAMOUT (I,J),J=1,3),(OUT(I,K),K=1,11)
      C     TOTAL ALL OUTPUT VALUES.
          DO 145 I = 1,81
          TOTOUT(I) = 0.0
          DO 145 J = 1,11
      145 TOTOUT(I) = TOTOUT(I) + OUT(I,J)
      C     TOTAL ALL INPUT VALUES.
          DO 146 I = 1,110
          TOTIN(I) = 0.0
          DO 146 J = 1,11
      146 TOTIN(I) = TOTIN(I) + XIN(I,J)
      149 PRINT 150,VEH,MIX,(NYEAR(K),K=1,11)
      150 FORMAT (1H1,T4,A1,1X,A4,T63'COST SUMMARY'/1X,T58'(THOUSANDS OF DOL
         1LARS)'/1X,T24,I4,10(6X,I4)/T127'TOTALS'/)
          PRINT 155,(OUT(1,K),K=1,11),TOTOUT(1),(ALPHA(I),(NAMEIN(I,J),J=1,2
         1),(XIN(I,J),J=1,11),TOTIN(I),I=1,3)
      155 FORMAT(1X,T4,'I. DEV'T18,11F10.2/T118,F14.2,3(//5X,A2,1X,2A4,1X,11
         1F10.2/T118,F14.2))
          PRINT 160, (OUT(34,J),J=1,11),TOTOUT(34)
      160 FORMAT (1HO,//T3'II. INV'T18,11F10.2/T118,F14.2)
          N=19
          DO 170 I = 1,4
          PRINT 165,ALPHA(I),(NAMOUT(N,K),K=1,2),(OUT(N,K),K=1,11),TOTOUT(N)
      165 FORMAT (1HO,T6,A2,1X,2A4,T18,11F10.2/T118,F14.2)
          GO TO (167,168,169,170),I
      167 N = 28
          GO TO 170
      168 N = 33
          GO TO 170
      169 N = 35
      170 CONTINUE
          PRINT 175, (OUT(65,J),J=1,11),TOTOUT(65)
      175 FORMAT (1HO,//T2'III. OPER'T18,11F10.2/T118,F14.2)
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      N = 38
      DO 185 I = 1,2
      PRINT165,ALPHA(I),(NAMOUT(N,K),K=1,2),(OUT(N,K),K=1,11),TOTOUT(N)
  185 N = 56
      N = 104
      PRINT 165,ALPHA(3),(NAMEIN(N,K),K=1,2),(XIN(N,K),K=1,11),TOTIN(N)
      N = 64
      PRINT165,ALPHA(4),(NAMOUT(N,K),K=1,2),(OUT(N,K),K=1,11),TOTOUT(N)
      PRINT 190, (OUT(70,J),J=1,11),TOTOUT(70)
  190 FORMAT (1HO,///T3'COL. TOTALS' T18,11F10.2/T118,F14.2,//  ,T20'PAR
     1AGRAPH II. D.----ASF IS A NON-ADD ITEM')
      PRINT 200, VEH,MIX,(NYEAR(K),K=1,11)
  200 FORMAT (1H1,/   ///////T4,A1,1X,A4,T58'WEAPON SYSTEM ANALYSIS'/T57
     1'PEMA PROCUREMENT PROGRAM'/T55'(COST IN $000/QUANTITY-EACH)'//T31'
     2FY',T35,I4,10(4X,I4),T123'TOTAL'T131'AAO')
      PRINT 204,(XIN(15,J),J=1,11),TOTIN(15),XIN(18,1)
  204 FORMAT (1HO, T20'QUANTITY'T31,11F8.0,F9.0,F6.0)
      PRINT 206,(OUT(5,J),J=1,11),TOTOUT(5)
  206 FORMAT (1X,T20'COST',T31,11F8.0,F9.0)
      PRINT 208,(OUT(6,J),J=1,11)
  208 FORMAT (1X,T20'UNIT COST'T31,11F8.0)
      PRINT 210, (XIN(16,J),J=1,11),TOTIN(16)
  210 FORMAT (1X,T20'DELIVERY'T31,11F8.0,F9.0)
      PRINT 212,(XIN(17,J),J=1,11)
  212 FORMAT (1X,T20'Y.E.ASSETS'T31,11F8.0)
      PRINT 204,(XIN(7,J),J=1,11),TOTIN(7),XIN(19,1)
      PRINT 206, (OUT(3,J),J=1,11),TOTOUT(3)
      PRINT 208, (XIN(8,J),J=1,11),TOTIN(8)
      PRINT 210,(XIN(9,J),J=1,11),TOTIN(9)
      PRINT 212, (XIN(10,J),J=1,11)
      PRINT 204, (XIN(11,J),J=1,11),TOTIN(11),XIN(20,1)
      PRINT 206, (OUT(4,J),J=1,11),TOTOUT(4)
      PRINT 208, (XIN(12,J),J=1,11),TOTIN(12)
      PRINT 210, (XIN(13,J),J=1,11),TOTIN(13)
      PRINT 212, (XIN(14,J),J=1,11)
      PRINT 214, (XIN(21,J),J=1,11),TOTIN(21)
  214 FORMAT (1X,///T20'MISC. HDW.'T31,11F8.0,F9.0)
      PRINT 216,(OUT(2,J),J=1,11), TOTOUT(2),(OUT(48,J),J=1,11),TOTOUT(4
     18), (OUT(66,J),J=1,11),TOTOUT(66)
  216 FORMAT (1HO,//T9'PBS'T31,11F8.0,F9.0/1X,T9'SRP'T31,11F8.0,F9.0/1X,
     1T9'FOT'T31,11F8.0,F9.0)
      PRINT 218,(OUT(72,J),J=1,11),TOTOUT(72)
  218 FORMAT (1HO,///T5'TOTAL COST'T31,11F8.0,F9.0)
      TEMP1 = TOTOUT(72) + TOCOMP(2)
      PRINT 219 , TOCOMP(1),TOCOMP(2),TEMP1
  219 FORMAT (1HO,///T80'QUANTITY TO COMPLETE (VEHICLE ONLY)',T119,F9.0/
     11X, T80 'COST TO COMPLETE' T119,F9.0//1HO,T80,'GRAND TOTAL COST',T
     2119,F9.0)
C     OUTPUT FOR WEAPON SYSTEM--7 FORMS/MIX--TOTAL = 21.************************
      PRINT 220,VEH,MIX,(NYEAR(I),I=1,11)
  220 FORMAT (1H1,////////        ,T4,A1,1X,A4,T54'WEAPON SYSTEM'/T61'($
     1 IN 000''S) BY FISCAL YEARS'//1X,'COST CATEGORY'T18,I4,10(6X,I4),T
     1127'TOTAL'/)
      N  = 1
      DO 228 NN = 1,3
      PRINT 222, (NAMOUT(N,K),K=1,2), (OUT(N,K),K=1,11), TOTOUT(N)
  222 FORMAT (1X,T4,2A4,T12,11F10.2,F12.2)
      GO TO (224,226,228) ,NN
  224 N = 34
      GO TO 228
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      226 N = 65
      228 CONTINUE
          PRINT 230, (OUT(70,K),K=1,11), TOTOUT(70)
      230 FORMAT (1HO,3X,'TOTAL',T12,11F10.2,F12.2)
          TEMP2 = TOTOUT(70) + TOCOMP(3) + TOCOMP(4)
          PRINT 231, (TOCOMP(I),I=3,4),TEMP2
      231 FORMAT (1HO///1X, T90 'COST TO COMPLETE' T113 'INV' T122,F12.2/1X,
         1T113 'OPER' T122,F12.2///1X,T90'GRAND TOTAL'T122,F12.2)
          PRINT 232, (NYEAR(K),K=1,11)
      232 FORMAT (1HO,/////T53 'COSTS BY BUDGET PROGRAM ELEMENTS'/1X,'APPROP
        1RIATION'/2X,'CATEGORY'T14'FY',T18,I4,10(6X,I4),T127'TOTAL' /)
          PRINT 234, (NAMEIN(1,K),K=1,2), (XIN(1,K),K=1,11),TOTIN(1 )
      234 FORMAT (1X,T4,2A4,T12,11F10.2,F12.2)
          DO 236 I = 67,68
      236 PRINT 234, (NAMOUT(I,K),K=1,2), (OUT(I,K),K=1,11), TOTOUT(I)
          PRINT 234,(NAMEIN(104,K),K=1,2),(XIN(104,K),K=1,11),TOTIN(104)
          PRINT 234, (NAMOUT(69,K),K=1,2),(OUT(69,K),K=1,11), TOTOUT(69)
          DO 243 J = 1,11
      243 TOTFM3(J) = TOTFM3(J)/1000.
          GTOTF3 = 0.0
          DO 235 I = 1,11
      235 GTOTF3 = GTOTF3 + TOTFM3(I)
          PRINT 238, (TOTFM3(K),K=1,11), GTOTF3
      238 FORMAT (1HO,T4'TOTAL'T12,11F10.2,F12.2)
          PRINT 240, (NAMOUT(35,K),K=1,2),(OUT(35,K),K=1,11),TOTOUT(35)
      240 FORMAT (1HO,/T4,2A4,T12,11F10.2,F12.2/1X,'(NON-ADD)')
      C   DIVIDE TOTOUT BY 1000. TO GET MILLIONS OF DOLLARS.
          DO 241 L = 1,81
      241 TOTOUT(L) = TOTOUT(L)/1000.
          TEMP3 = GTOTF3    + TOCOMP(5) + TOCOMP(6) + TOCOMP(7)
          PRINT 245, (TOCOMP(I),I=5,7),TEMP3
      245 FORMAT (1HO///1X,T90 'COST TO COMPLETF' T113 'PEMA' T122,F12.2/T11
         13 'OMA' T122,F12.2/1X,T113 'MPA' T122,F12.2//1HO,T90 'GRAND TOTAL'
         2T122,F12.2)
      C   DIVIDE RDTE,MPAI,OMAI,TRAIN1U,TRAIN2U,SPEQUIP,AND NGOMA BY 1000 TO GET
          MILLIONS OF DOLLARS. ***************************************************
          TOCOMP(8) = TOCOMP(8)/1000.
          TOCOMP(10) = TOCOMP(10)/1000.
          TOCOMP(12) = TOCOMP(12)/1000.
          TOCOMP(13) = TOCOMP(13)/1000.
          DO 242 L = 1,3
      242 TOTIN(L) = TOTIN(L)/1000.
          TOTIN(8) = TOTIN(8)/1000.
          TOTIN(12) = TOTIN(12)/1000.
          TOTIN(21) = TOTIN(21)/1000.
          TOTIN(104) = TOTIN(104)/1000.
          SBV(JJJ,JJ,1) = TOTIN(15)+ TOCOMP(1)
          SBV(JJJ,JJ,2) = TOTOUT(5) + TOCOMP(8)
          SBV(JJJ,JJ,3) = TOTIN(7) + TOCOMP(9)
          SBV(JJJ,JJ,4) = TOTOUT(3) + TOCOMP(10)
          SBV(JJJ,JJ,5) = TOTIN(11) + TOCOMP(11)
          SBV(JJJ,JJ,6) = TOTOUT(4) + TOCOMP(12)
          SBV(JJJ,JJ,7) = 0.0
          SBV(JJJ,JJ,8) = TOTIN(21) + TOCOMP(13)
          SBV(JJJ,JJ,9) = SBV(JJJ,JJ,1) + SBV(JJJ,JJ,3) + SBV(JJJ,JJ,5)
          SBV(JJJ,JJ,10)=SBV(JJJ,JJ,2)+SBV(JJJ,JJ,4)+SBV(JJJ,JJ,6)+SBV(JJJ,J
         1J,8)
      246 CONTINUE
      C   END OF JJ DO LOOP.  ************************************************
          DO 250 J = 1,7
```

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      DO 250 K = 1,10
250   DIFF(J,K) = SBV(JJJ,J,K) - SBV(1,J,K)
C     OUTPUT FOR WEAPON SYSTEM SUMMARY--1 FORM/MIX--TOTAL = 3. ****************
      PRINT 260, MIX
260   FORMAT(1H1,          T51'WEAPON SYSTEM SUMMARY'//1X,T59,A4,/1X,T47'
     1(COST IN $ MILLIONS/QTY--EACH)'//1X,T48'PROPOSED PROGRAM'T85'INCRE
     2ASE OR DECREASE (-)'/1X,T8'SYSTEM' T85'OVER PRESENT PROGRAM'//1X,T
     345 'QTY' T64 'COST' T85'QTY' T104'COST'/)
      DO 271 M = 1,7
      PRINT 265, M,(SBV(JJJ,M,K),K=1,2),(DIFF(M,K),K=1,2)
265   FORMAT (1HO,I1/1X,T6'VEHICLE'T31,4F20.3)
      PRINT 267,(SBV(JJJ,M,K),K=3,4),(DIFF(M,K),K=3,4)
267   FORMAT (1H ,T6'TRAINER 1' T31,4F20.3)
      PRINT 268, (SBV(JJJ,M,K),K=5,6),(DIFF(M,K),K=5,6)
268   FORMAT (1X,T6'TRAINER 2' T31,4F20.3)
      PRINT 270, (SBV(JJJ,M,K),K=7,8),(DIFF(M,K),K=7,8)
270   FORMAT (1X,T6 'MISC. HDW.' ,T31,4F20.3)
271   PRINT 272,(SBV(JJJ,M,K),K=9,10),(DIFF(M,K),K=9,10)
272   FORMAT (1HO, T6'TOTAL'T31,4F20.3//)
      DO 290 K = 1,4
      DO 290 L = 1,17
      STOR(JJJ,K,L) = STOR(JJJ,K,L)/1000000.
      IF ( L .GE. 12) GO TO 280
      STOR (JJJ,K,18) = STOR(JJJ,K,18) + STOR(JJJ,K,L)
      GO TO 290
280   STOR (JJJ,K,19) = STOR(JJJ,K,19) + STOR(JJJ,K,L)
290   CONTINUE
      DO 294 K = 1,6
      DO 294 L = 1,17
      SAVE (JJJ,K,L) = SAVE(JJJ,K,L)/1000000.
      IF ( L .GE. 12) GO TO 293
      SAVE(JJJ,K,18) = SAVE(JJJ,K,18) + SAVE(JJJ,K,L)
      GO TO 294
293   SAVE(JJJ,K,19) = SAVE(JJJ,K,19) + SAVE(JJJ,K,L)
294   CONTINUE
      DO 296 K = 1,4
296   STOR(JJJ,K,20) = STOR(JJJ,K,18) + STOR(JJJ,K,19)
      DO 298 K = 1,6
298   SAVE(JJJ,K,20) = SAVE(JJJ,K,18) + SAVE(JJJ,K,19)
      DO 300 K = 1,4
      DO 300 L = 1,20
300   XDIF(JJJ,K,L) = STOR(JJJ,K,L) - STOR(1,K,L)
      DO 302 K = 1,6
      DO 302 L = 1,20
302   YDIF(JJJ,K,L) = SAVE(JJJ,K,L) - SAVE(1,K,L)
C     OUTPUT FOR COST ANALYSIS---1 FORM/MIX--TOTAL = 3.*************************
      PRINT 305, MIX,(NYEAR(K),K=1,11)
305   FORMAT (1H1, 6(/1HO),T62'COST ANALYSIS' /1X,T58,A4' BY COST CATEGO
     1RY'/1X, T60'(COST IN $MILLIONS)'////1X, T15'COST' T22'FY' T26 I4,1
     120(5X,I4), T127'TOTAL'/1X,T13 'CATEGORY'///)
      PRINT 307, ((STOR(JJJ,K,L),L=1,11),STOR(JJJ,K,18),K=1,4)
307   FORMAT (1X, T15 'DEVEL'T20,11F9.2,F12.2//1X,'PROPOSED' T15'INVEST'
     1T20,11F9.2,F12.2/1X,'PROGRAM'/1X,T15 'OPER'T20,11F9.2,F12.2//1X,T1
     25 'TOTAL' T20,11F9.2,F12.2////)
      PRINT 310, ((XDIF(JJJ,K,L),L=1,11),XDIF(JJJ,K,18),K=1,4)
310   FORMAT (1X,T15 'DEVEL' T20,11F9.2,F12.2,//1X,'INCREASE OR' T15 'IN
     1VEST' T20,11F9.2,F12.2/1X, 'DECREASE (-)'/1X, 'OVER CURRENT' T15 '
     2OPER' T20,11F9.2,F12.2/1X, 'PROGRAM'/1X, T15 'TOTAL' T20,11F9.2,F1
     32.2)
      PRINT 317, (STOR(JJJ, I,19),I=2,3)
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425      317 FORMAT (1HO//1X,T97 'COSTS TO COMPLETION'///1X,T94'PROPOSED' T109
            1'INV' T119,F12.2/1X,T94 'PROGRAM'/1X,T109 'OPER' T119,F12.2)
426          PRINT 318, (XDIF(JJJ,K,19),K=2,3)
427      318 FORMAT (1HO///1X,T94 'INCREASE OR'/1X,T94 'DECREASE (-)'T109'INV'
            2T119,F12.2/1X,T94 'OVER CURRENT'/1X,T94'PROGRAM' T109 'OPER'T119,F
            212.2)
428      315 CONTINUE
         C       END OF JJJ DO LOOP.  ****************************************************
429          WRITE (6,320)
430      320 FORMAT (1H1,9(/1HO), T58'COST ANALYSIS SUMMARY' /1X,T55 'TOTAL COS
            1T BY COST CATEGORY'/1X, T58'(COSTS IN $ MILLIONS)'////1X, T55 'COS
            2T',T66 'CURRENT' T79 'PROPOSED PROGRAM'/1X,T53 'CATEGORY' T66 'PRO
            4GRAM' T78 'MIX A' T90 'MIX B'/)
431          PRINT 330,((STOR(I,J,20),I=1,3),J=1,4)
432      330 FORMAT (1X, T53 'DEVEL' T59,3F12.2//1X,T53 'INVEST' T59,3F12.2,/1X
            1,T37 'TOTAL COST'/1X,T53 'OPER'T59,3F12.2,//1X,T53 'TOTAL' T59,3F1
            22.2////)
433          PRINT 340, ((XDIF(I,J,20),I=1,3),J=1,4)
434      340 FORMAT (1X, T53 'DEVEL' T59,3F12.2//1X,T37 'INCREASE OR' T53  'INV
            1EST' T59,3F12.2/1X,T37 'DECREASE (-)'/1X,T37 'OVER CURRENT' T53 'O
            2PER' T59,3F12.2/1X,T37 'PROGRAM'/1X, T53 'TOTAL' T59,3F12.2)
435          WRITE (6,350)
436      350 FORMAT (1H1,7(/1HO),T58 'COST ANALYSIS SUMMARY' /1X,T55 'TOTAL COS
            1T BY APPROPRIATION'/1X, T58 '(COSTS IN $ MILLIONS)'////1X, T52 'CO
            2ST' T66 'CURRENT' T79 'PROPOSED PROGRAM'/1X,T47 'APPROPRIATION' T6
            36 'PROGRAM' T78 'MIX A' T90 'MIX B'/)
437          PRINT 360, ((SAVE(I,J,20),I=1,3),J=1,6)
438      360 FORMAT (1X, T53 'RDTE' T59,3F12.2//1X,T53 'PEMA' T59,3F12.2//1X,T3
            17 'TOTAL COST' T53 'OMA' T59, 3F12.2//1X,T53 'NGOMA' T59,3F12.2//T
            253 'MPA' T59,3F12.2//1X,T53 'TOTAL' T59,3F12.2////)
439          PRINT 370, ((YDIF(I,J,20),I=1,3),J=1,6)
440      370 FORMAT (1X,T53 'RDTE' T59,3F12.2//1X,T37 'INCREASE OR' T53 'PEMA'
            1T59,3F12.2/1X,T37 'DECREASE (-)'/1X,T37 'OVER CURRENT' T53 'OMA' T
            259,3F12.2/1X,T37 'PROGRAM' /1X, T53 'NGOMA' T59,3F12.2//1X, T53 'M
            3PA' T59,3F12.2//1X, T53 'TOTAL' T59,3F12.2)
441          WRITE (6,555)
442      555 FORMAT (1H1, T40 'THIS IS THE END.  TRY AGAIN.'  )
443          GO TO 702
444      700 PRINT 701, KSAVE
445      701 FORMAT(1H1,'ERROR IN LINE NO.    ',I5)
446      702 CALL EXIT
447          END

         $ENTRY
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1

INPUT DATA

	ITEM/FY		1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1	RDTE	$	345000.00	226040.00	105000.00	1500000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	MPAI	$	550000.00	467500.00	247500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	OMAI	$	232000.00	602000.00	1100000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	APE	$	249000.00	486000.00	399000.00	211000.00	3500000.00	500000.00	0.00	0.00	0.00	0.00	0.00
5	FAC	$	0.00	1320000.00	399970.00	1000000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	LAYF	$	0.00	0.00	392160.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	TRAIN1P	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	TRAIN1U	$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	TRAIN1D	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	TRAIN1A	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	TRAIN2P	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	TRAIN2U	$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	TRAIN2D	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	TRAIN2A	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	TANKP	Q	0.00	0.00	0.00	97.00	430.00	450.00	450.00	450.00	450.00	450.00	450.00
16	TANKD	Q	0.00	0.00	0.00	0.00	70.00	400.00	450.00	450.00	450.00	450.00	450.00
17	TANKA	Q	0.00	0.00	0.00	0.00	70.00	470.00	920.00	1370.00	1820.00	2270.00	2721.00
18	AAOTANK	Q	3147.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	AAOTRAIN1	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	AAOTRAIN2	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	SPEQUIP	$	0.00	0.00	0.00	6430394.00	182769.10	0.00	0.00	0.00	0.00	0.00	0.00
22	A	$	1442407.00	1442407.00	1442407.00	1442407.00	1442407.00	1442407.00	1442407.00	1442407.00	1442407.00	1442407.00	1442407.00
23	B	N	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17
24	F	Q	-0.00	-0.00	-0.00	1.00	98.00	728.00	1388.00	2048.00	2708.00	3368.00	4028.00
25	TOOLINIT	$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	ENG	$	0.00	0.00	0.00	7402064.00	111030.96	9715209.00	8789951.00	7864693.00	5551350.00	5551350.00	5551350.00
27	QA	$	0.00	0.00	0.00	500000.00	1500000.00	1500000.00	750000.00	500000.00	400000.00	400000.00	400000.00
28	PAGES	N	0.00	0.00	0.00	15859.00	1752.00	3505.00	1752.00	2629.00	2629.00	1051.00	1051.00
29	CONTOTH	$	0.00	0.00	0.00	4541340.00	144640.42	8022074.00	2852293.00	4159594.00	1842106.00	1604415.00	1366724.00
30	F1	N	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
31	F2	$	138.61	138.61	138.61	138.61	138.61	138.61	138.61	138.61	138.61	138.61	138.61
32	F3	N	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
33	F4	N	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
34	F5	N	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
35	F6	N	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
36	F7	N	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
37	F8	N	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
38	F9	N	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
39	XSRPIP	$	0.00	0.00	0.00	25970.00	168670.00	176702.00	176702.00	0.00	0.00	0.00	0.00
40	F10	$	1788.00	1788.00	1788.00	1788.00	1788.00	1788.00	1788.00	1788.00	1788.00	1788.00	1788.00
41	F11	$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42	F12	$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	F13	$	50311.00	50311.00	50311.00	50311.00	50311.00	50311.00	50311.00	50311.00	50311.00	50311.00	50311.00
44	F14	$	169.00	169.00	169.00	169.00	169.00	169.00	169.00	169.00	169.00	169.00	169.00
45	MTR	N	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
46	CTR	N	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
47		Q	0.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00	0.00	0.00	0.00
48		Q	0.00	0.00	0.00	0.00	37.00	293.00	110.00	0.00	0.00	0.00	0.00
49		Q	0.00	0.00	0.00	0.00	0.00	0.00	348.00	0.00	0.00	0.00	0.00
50		Q	0.00	0.00	0.00	0.00	0.00	179.00	0.00	0.00	0.00	540.00	592.00
51		Q	0.00	0.00	0.00	0.00	0.00	8.00	142.00	236.00	0.00	0.00	0.00
52		Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53		Q	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
54		Q	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
55		Q	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37

INPUT DATA

	ITEM/FY		1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
56		Q	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
57		Q	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53
58		Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
59	TOEINC	Q	0.00	0.00	0.00	0.00	0.00	400.00	600.00	236.00	0.00	540.00	456.00
60	TOEMP	Q	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
61	TOECP	Q	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
62	FBP21AITM	$	1188.00	1188.00	1188.00	1188.00	1188.00	1188.00	1188.00	1188.00	1188.00	1188.00	1188.00
63	FBP21AITC	$	1497.00	1497.00	1497.00	1497.00	1497.00	1497.00	1497.00	1497.00	1497.00	1497.00	1497.00
64	BP21NET	$	0.00	0.00	0.00	0.00	18133.00	0.00	0.00	0.00	0.00	0.00	0.00
65	FBP22PROC	$	12500.00	12500.00	12500.00	12500.00	12500.00	12500.00	12500.00	12500.00	12500.00	12500.00	12500.00
66	FBP22SUPLY	$	13000.00	13000.00	13000.00	13000.00	13000.00	13000.00	13000.00	13000.00	13000.00	13000.00	13000.00
67	FBP22MNGT	$	13514.00	13514.00	13514.00	13514.00	13514.00	13514.00	13514.00	13514.00	13514.00	13514.00	13514.00
68	MYBP22PROC	Q	0.00	0.00	0.00	66.00	87.00	86.00	130.00	128.00	128.00	109.00	101.00
69	MYBP22SUPLY	Q	0.00	0.00	0.00	23.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	MYBP22MNGT	Q	0.00	22.00	81.00	148.00	148.00	148.00	148.00	126.00	104.00	81.00	59.00
71	BP2300II	$	271000.00	400000.00	646000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72	FMPAITM	$	2313.00	2313.00	2313.00	2313.00	2313.00	2313.00	2313.00	2313.00	2313.00	2313.00	2313.00
73	FMPAITC	$	7023.00	7023.00	7023.00	7023.00	7023.00	7023.00	7023.00	7023.00	7023.00	7023.00	7023.00
74	FMPA22II	$	11671.00	11671.00	11671.00	11671.00	11671.00	11671.00	11671.00	11671.00	11671.00	11671.00	11671.00
75	MYPA22II	Q	0.00	7.00	26.00	47.00	47.00	43.00	39.00	34.00	30.00	26.00	21.00
76	MPA23II	$	0.00	0.00	0.00	0.00	33755.00	0.00	0.00	0.00	0.00	0.00	0.00
77	XASF	$	0.00	0.00	0.00	4044150.00	262661.30	275168.98	192088.18	8308080.00	0.00	0.00	0.00
78	F17	$	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00
79	DINUSE	Q	0.00	0.00	0.00	0.00	25.00	289.00	829.00	1247.00	1365.00	1635.00	2201.00
80	F18	$	25.46	25.46	25.46	25.46	25.46	25.46	25.46	25.46	25.46	25.46	25.46
81	TOECON	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	270.00	768.00
82	TOEOVS	Q	0.00	0.00	0.00	0.00	0.00	200.00	700.00	1118.00	1236.00	1236.00	1236.00
83	CONMILES	Q	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00
84	OVSMILES	Q	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00
85	MYBP22PROP	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	MYBP22SMA	Q	0.00	0.00	0.00	58.00	71.00	75.00	73.00	72.00	73.00	73.00	73.00
87	MYBP22MAN	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	REBILD	Q	0.00	0.00	0.00	0.00	0.00	0.00	55.20	42.20	116.20	192.20	427.20
89	OVSHIP	Q	0.00	0.00	0.00	0.00	0.00	582.00	660.00	660.00	660.00	16.00	27.00
90	F19	$	2367.00	2367.00	2367.00	2367.00	2367.00	2367.00	2367.00	2367.00	2367.00	2367.00	2367.00
91	F20	$	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00
92	F21	$	184.00	184.00	184.00	184.00	184.00	184.00	184.00	184.00	184.00	184.00	184.00
93	F22	$	37628.00	37628.00	37628.00	37628.00	37628.00	37628.00	37628.00	37628.00	37628.00	37628.00	37628.00
94	F23	$	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84
95	BP22PE	$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
96	BP22IPP	$	0.00	0.00	0.00	93000.00	73000.00	69000.00	52000.00	52000.00	52000.00	49000.00	41000.00
97	BP22SDOP	$	0.00	0.00	0.00	0.00	62000.00	682000.00	1633000.00	1837000.00	1479000.00	1364000.00	1836000.00
98	FBP23SUP	$	13782.00	13782.00	13782.00	13782.00	13782.00	13782.00	13782.00	13782.00	13782.00	13782.00	13782.00
99	MYBP23SUP	Q	0.00	0.00	0.00	35.00	47.00	44.00	37.00	35.00	34.00	24.00	18.00
100	BP230TH	$	0.00	0.00	0.00	0.00	0.00	0.00	474930.00	360595.00	1011425.00	1679845.00	3746670.00
101	BP2600	$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
102	TACON	Q	0.00	0.00	0.00	0.00	25.00	70.00	90.00	90.00	90.00	90.00	158.00
103	TAOVS	Q	0.00	0.00	0.00	0.00	0.00	19.00	39.00	39.00	39.00	39.00	39.00
104	NGOMA	$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	CRUPACON	$	16591.00	16591.00	16591.00	16591.00	16591.00	16591.00	16591.00	16591.00	16591.00	16591.00	16591.00
106	CRUPAOVS	$	17123.00	17123.00	17123.00	17123.00	17123.00	17123.00	17123.00	17123.00	17123.00	17123.00	17123.00
107	MAINTPACON	$	5138.00	5138.00	5138.00	5138.00	5138.00	5138.00	5138.00	5138.00	5138.00	5138.00	5138.00
108	MAINTPAOVS	$	5353.00	5353.00	5353.00	5353.00	5353.00	5353.00	5353.00	5353.00	5353.00	5353.00	5353.00
109	FMPA22III	$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	MYMPA22III	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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OUTPUT DATA
COSTS IN THOUSANDS OF DOLLARS

	ITEM/FY	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1	DEV	1127.00	1295.54	1452.50	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	PBS	249.00	1806.00	1191.13	1211.00	3500.00	500.00	0.00	0.00	0.00	0.00	0.00
3	TRAIN1C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	TRAIN2C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	TANKC	0.00	0.00	0.00	102857.56	272212.72	252029.52	224436.73	212875.88	199326.10	192414.12	187001.77
6	TANKU	0.00	0.00	0.00	1060.39	633.05	560.07	498.75	473.06	442.95	427.59	415.56
7	TANKFAB	0.00	0.00	0.00	77337.00	240513.84	205259.33	187650.79	177071.89	169619.38	163914.68	159329.28
8	TOOLMAINT	0.00	0.00	0.00	1044.05	3246.94	2771.00	2533.29	2390.47	2289.86	2212.85	2150.95
9	TOOL	0.00	0.00	0.00	1044.05	3246.94	2771.00	2533.29	2390.47	2289.86	2212.85	2150.95
10	DOC	0.00	0.00	0.00	2198.22	242.84	485.83	242.84	364.41	364.41	145.68	145.68
11	CONTCOST	0.00	0.00	0.00	88854.34	238996.28	219324.86	195306.20	185433.74	173997.48	167909.44	163145.09
12	GA	0.00	0.00	0.00	3720.33	10006.77	9183.13	8177.47	7764.11	7285.27	7030.37	6830.88
13	PROFIT	0.00	0.00	0.00	6114.56	16446.65	15092.95	13440.10	12760.72	11973.73	11554.77	11226.91
14	TANKOTH	0.00	0.00	0.00	25520.56	31698.88	46770.20	36785.94	35803.99	29706.72	28499.43	27672.50
15	MI	0.00	0.00	0.00	109287.95	272395.49	252029.52	224436.73	212875.88	199326.10	192414.12	187001.77
16	SRPIP	0.00	0.00	0.00	25.97	168.67	176.70	176.70	0.00	0.00	0.00	0.00
17	HDW	0.00	0.00	0.00	109313.92	272564.16	252206.22	224613.43	212875.88	199326.10	192414.12	187001.77
18	FDTII	0.00	0.00	0.00	0.09	125.73	715.79	805.19	804.60	804.60	804.60	804.60
19	PEMAII	249.00	1806.00	1191.13	110525.01	276189.88	253422.02	225418.63	213680.48	200130.70	193218.72	187806.37
20	BP21AITM	0.00	0.00	0.00	0.00	0.00	109.54	244.16	80.24	0.00	230.95	91.62
21	BP21AITC	0.00	0.00	0.00	0.00	0.00	0.00	95.81	37.68	0.00	86.23	0.00
22	BP21AIT	0.00	0.00	0.00	0.00	0.00	109.54	339.96	117.92	0.00	317.17	91.62
23	BP2100II	0.00	0.00	0.00	0.00	18.13	109.54	339.96	117.92	0.00	317.17	91.62
24	BP22PROC	0.00	0.00	0.00	825.00	1087.50	1075.00	1625.00	1600.00	1600.00	1362.50	1262.50
25	BP22SUPLY	0.00	0.00	0.00	299.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	BP22MNGT	0.00	297.31	1094.63	2000.07	2000.07	2000.07	2000.07	1702.76	1405.46	1094.63	797.33
27	BP2200II	0.00	297.31	1094.63	3124.07	3087.57	3075.07	3625.07	3302.76	3005.46	2457.13	2059.83
28	OMAII	271.00	697.31	1740.63	3124.07	3105.71	3184.62	3965.04	3420.69	3005.46	2774.31	2151.44
29	MPAITM	0.00	0.00	0.00	0.00	0.00	213.28	475.37	156.22	0.00	449.65	178.38
30	MPAITC	0.00	0.00	0.00	0.00	0.00	0.00	449.47	176.79	0.00	404.52	0.00
31	MPA21II	0.00	0.00	0.00	0.00	0.00	213.28	924.84	333.01	0.00	854.17	178.38
32	MPA22II	0.00	81.70	303.45	548.54	548.54	501.85	455.17	396.81	350.13	303.45	245.09
33	MPAII	0.00	81.70	303.45	548.54	582.29	715.13	1380.01	729.83	350.13	1157.62	423.47
34	INV	520.00	2585.00	3235.21	114197.62	279877.88	257321.77	230763.67	217831.00	203486.29	197150.64	190381.29
35	ASE	0.00	0.00	0.00	4044.15	262.66	275.17	192.09	8308.08	0.00	0.00	0.00
36	SRPR	0.00	0.00	0.00	0.00	6.70	77.45	222.17	334.20	365.82	438.18	589.87
37	FDTIII	0.00	0.00	0.00	0.00	0.02	0.26	0.75	1.12	1.23	1.47	1.98
38	PEMAIII	0.00	0.00	0.00	0.00	6.72	77.71	222.92	335.32	367.05	439.65	591.85
39	BP2000III	0.00	0.00	0.00	0.00	0.00	6110.40	21386.40	34157.14	37762.27	46011.31	61226.21
40	BP21MAINT	0.00	0.00	0.00	0.00	0.00	0.00	171.07	427.68	528.61	528.61	759.56
41	BP21CREW	0.00	0.00	0.00	0.00	0.00	0.00	197.60	494.01	610.60	610.60	877.36
42	BP2100III	0.00	0.00	0.00	0.00	0.00	0.00	368.68	921.69	1139.21	1139.21	1636.92
43	BP22PROP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44	BP22SMA	0.00	0.00	0.00	754.00	923.00	975.00	949.00	936.00	949.00	949.00	949.00
45	BP22MAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	SDTRER	0.00	0.00	0.00	0.00	0.00	0.00	130.66	99.89	275.05	454.94	1011.18
47	SDTANKS	0.00	0.00	0.00	0.00	0.00	1027.23	1164.90	1164.90	1164.90	28.24	47.66
48	SRP	0.00	0.00	0.00	25.97	175.37	254.15	398.87	334.20	365.82	438.18	589.87
49	SDTPOWP	0.00	0.00	0.00	0.00	0.00	0.93	1.46	1.22	1.34	1.32	1.33
50	SDTOVS	0.00	0.00	0.00	0.00	0.00	1028.16	1166.36	1166.12	1166.24	29.56	48.90
51	SDT	0.00	0.00	0.00	0.00	0.00	1028.16	1297.02	1266.01	1441.28	484.49	1060.17
52	BP2200III	0.00	0.00	0.00	847.00	1058.00	2754.16	3931.02	4091.01	3921.28	2846.49	3886.17
53	BP23REB	0.00	0.00	0.00	0.00	55.20	638.11	3907.50	4341.28	7386.29	10842.18	20934.49
54	BP23SUP	0.00	0.00	0.00	482.37	647.75	606.41	509.93	482.37	468.59	330.77	248.08
55	BP2300III	0.00	0.00	0.00	482.37	702.95	1244.52	4892.36	5184.24	8866.31	12852.79	24929.24

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OUTPUT DATA
COSTS IN THOUSANDS OF DOLLARS

	ITEM/FY	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
56	OMAIII	0.00	0.00	0.00	1329.37	1760.95	10109.08	30579.45	44354.08	51689.07	62849.81	91678.53
57	MPA20CREW	0.00	0.00	0.00	0.00	0.00	3424.60	11986.10	19143.51	21164.03	25643.60	33905.92
58	MPA20MAINT	0.00	0.00	0.00	0.00	0.00	1070.60	3747.10	5984.65	6616.31	8003.57	10562.29
59	MPA20III	0.00	0.00	0.00	0.00	0.00	4495.20	15733.20	25128.17	27780.34	33647.17	44468.21
60	MPA21CREW	0.00	0.00	0.00	0.00	0.00	0.00	927.04	2317.59	2864.54	2864.54	4116.04
61	MPA21MAINT	0.00	0.00	0.00	0.00	0.00	0.00	333.07	832.68	1029.19	1029.19	1478.84
62	MPA21III	0.00	0.00	0.00	0.00	0.00	0.00	1260.11	3150.27	3893.73	3893.73	5594.88
63	MPA22III	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
64	MPAIII	0.00	0.00	0.00	0.00	0.00	4495.20	16993.31	28278.44	31674.07	37540.90	50063.09
65	OPER	0.00	0.00	0.00	1329.37	1767.68	14681.99	47794.68	72967.83	83730.19	100830.36	142333.47
66	FDT	0.00	0.00	0.00	0.09	125.75	716.05	805.94	805.72	805.83	806.07	806.58
67	PEMA	249.00	1806.00	1191.13	110525.01	276196.61	253499.73	225641.54	214015.80	200497.75	193658.37	188398.22
68	OMA	503.00	1299.31	2840.63	4453.44	4866.66	13293.70	34543.49	47774.77	54694.53	65624.12	93829.98
69	MPA	550.00	549.20	550.95	548.54	582.29	5210.33	18373.31	29008.27	32024.20	38698.52	50486.56
70	TOT	1647.00	3880.54	4687.71	117026.99	281645.56	272003.76	278558.35	290798.83	287216.48	297981.00	332714.76
71	Y	0.00	0.00	0.00	797.29	559.33	456.13	417.00	393.49	376.93	364.25	354.07
72	TPC	249.00	1806.00	1191.13	110525.01	276196.61	253499.73	225641.54	214015.80	200497.75	193658.37	188398.22

OUTPUT DATA
COSTS/QUANTITIES IN DOLLARS/UNITS

	ITEM/FY	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
73	X	0.00	0.00	0.00	34.00	280.00	942.00	1606.00	2268.00	2929.00	3590.00	4250.00
74	TANK INC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	F15	0.00	0.00	0.00	0.00	0.00	0.23	0.34	0.29	0.00	0.36	0.17
76	F16	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.00	0.11	0.00
77	INHERMA	0.00	0.00	0.00	0.00	0.00	421.67	540.44	230.79	0.00	473.47	519.07
78	INHERCR	0.00	0.00	0.00	0.00	0.00	1286.40	1608.00	632.48	0.00	1447.20	1586.56

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COST SUMMARY
(THOUSANDS OF DOLLARS)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	TOTALS
I. DEV	1127.00	1295.54	1452.50	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5375.04
A. RDTE	345.00	226.04	105.00	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2176.04
B. MPAI	550.00	467.50	247.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1265.00
C. OMAI	232.00	602.00	1100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1934.00
II. INV	520.00	2585.00	3235.21	114197.62	279877.88	257321.77	230763.67	217831.00	203486.29	197150.64	190381.29	1697350.37
A. PEMAII	249.00	1806.00	1191.13	110525.01	276189.88	253422.02	225418.63	213680.48	200130.70	193218.72	187806.37	1663637.95
B. OMAII	271.00	697.31	1740.63	3124.07	3105.71	3184.62	3965.04	3420.69	3005.46	2774.31	2151.44	27440.27
C. MPAII	0.00	81.70	303.45	548.54	582.29	715.13	1380.01	729.83	350.13	1157.62	423.47	6272.16
D. ASF	0.00	0.00	0.00	4044.15	262.66	275.17	192.09	8308.08	0.00	0.00	0.00	13082.15
III. OPER	0.00	0.00	0.00	1329.37	1767.68	14681.99	47794.68	72967.83	83730.19	100830.36	142333.47	465435.57
A. PEMAIII	0.00	0.00	0.00	0.00	6.72	77.71	222.92	335.32	367.05	439.65	591.85	2041.22
B. OMAIII	0.00	0.00	0.00	1329.37	1760.95	10109.08	30578.45	44354.08	51689.07	62849.81	91678.53	294349.35
C. NGOMA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. MPAIII	0.00	0.00	0.00	0.00	0.00	4495.20	16993.31	28278.44	31674.07	37540.90	50063.09	169045.00
COL. TOTALS	1647.00	3880.54	4687.71	117026.99	281645.56	272003.76	278558.35	290798.83	287216.48	297981.00	332714.76	2168160.98

PARAGRAPH II. D.----ASF IS A NON-ADD ITEM

WEAPON SYSTEM ANALYSIS
PEMA PROCUREMENT PROGRAM
(COST IN $000/QUANTITY-EACH)

	FY	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	TOTAL	AAO
QUANTITY		0.	0.	0.	97.	430.	450.	450.	450.	450.	450.	450.	3227.	3147.
COST		0.	0.	0.	102858.	272213.	252030.	224437.	212876.	199326.	192414.	187002.	1643154.	
UNIT COST		0.	0.	0.	1060.	633.	560.	499.	473.	443.	428.	416.		
DELIVERY		0.	0.	0.	0.	70.	400.	450.	450.	450.	450.	450.	2720.	
Y.E.ASSETS		0.	0.	0.	0.	70.	470.	920.	1370.	1820.	2270.	2721.		
QUANTITY		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
COST		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
UNIT COST		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
UNIT COST		0.												
DELIVERY		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
Y.E.ASSETS		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
QUANTITY		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
COST		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
UNIT COST		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
UNIT COST		0.												
DELIVERY		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
Y.E.ASSETS		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
MISC. HDW.		0.	0.	0.	6430.	183.	0.	0.	0.	0.	0.	0.	6613.	
PBS		249.	1806.	1191.	1211.	3500.	500.	0.	0.	0.	0.	0.	8457.	
SRP		0.	0.	0.	26.	175.	254.	399.	334.	366.	438.	590.	2582.	
FDT		0.	0.	0.	0.	126.	716.	806.	806.	806.	806.	807.	4872.	
TOTAL COST		249.	1806.	1191.	110525.	276197.	253500.	225642.	214016.	200498.	193658.	188398.	1665679.	

QUANTITY TO COMPLETE (VEHICLE ONLY) 0.
COST TO COMPLETE 0.

GRAND TOTAL COST 1665679.

1

WEAPON SYSTEM
($ IN 000'S) BY FISCAL YEARS

COST CATEGORY	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	TOTAL
DEV	1127.00	1295.54	1452.50	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5375.04
INV	520.00	2585.00	3235.21	114197.62	279877.88	257321.77	230763.67	217831.00	203486.29	197150.64	190381.29	1697350.37
OPER	0.00	0.00	0.00	1329.37	1767.68	14681.99	47794.68	72967.83	83730.19	100830.36	142333.47	465435.57
TOTAL	1647.00	3880.54	4687.71	117026.99	281645.56	272003.76	278558.35	290798.83	287216.48	297981.00	332714.76	2168160.98

COST TO COMPLETE	INV	0.00
	OPER	0.00
GRAND TOTAL		2168160.98

COSTS BY BUDGET PROGRAM ELEMENTS

APPROPIATION CATEGORY	FY 1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	TOTAL
RDTE	345.00	226.04	105.00	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2176.04
PEMA	249.00	1806.00	1191.13	110525.01	276196.61	253499.73	225641.54	214015.80	200497.75	193658.37	188398.22	1665679.17
OMA	503.00	1299.31	2840.63	4453.44	4866.66	13293.70	34543.49	47774.77	54694.53	65624.12	93829.98	323723.62
NGOMA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MPA	550.00	549.20	550.95	548.54	582.29	5210.33	18373.31	29008.27	32024.20	38698.52	50486.56	176582.16
TOTAL	1647.00	3880.54	4687.71	117026.99	281645.56	272003.76	278558.35	290798.83	287216.48	297981.00	332714.76	2168160.98
ASF (NON-ADD)	0.00	0.00	0.00	4044.15	262.66	275.17	192.09	8308.08	0.00	0.00	0.00	13082.15

COST TO COMPLETE	PEMA	0.00
	OMA	0.00
	MPA	0.00
GRAND TOTAL		2168160.98

SECTION III

MBT SECONDARY ARMAMENT LIFE CYCLE COST MODEL
(FOR MBT SECONDARY ARMAMENT STUDY)

1. Narrative:

a. (U) The following automated cost model, which includes costs for ammunition as well as for weapons, was developed specifically for this study by Headquarters, U. S. Army Weapons Command in cooperation with personnel from the U. S. Army Ammunition Procurement and Supply Agency, a subordinate installation of the U. S. Army Munitions Command.

b. (U) The model consists of a series of 66 cost equations presented in paragraph 2 below. Paragraph 3 presents the nomenclature of the 66 data names appearing on the left side of these equations.

c. (U) In addition, the cost equations utilize a set of 106 items of information, or basic data, to calculate RDT&E, PEMA, O&M,A, and MPA costs for each year. The data names for these 106 items are listed under paragraph 4 below and a word description for each is presented with the listing.

d. (U) The listings presented in paragraphs 3 and 4 below are identical to the listings of data in two of the computer output formats presented for each of the fifteen (15) cases in Section V of this report.

2. Cost Equations:

Equation No.		
(1)	TOTBAL	= (BALTOECON)(TA) + (BALTOEUR)(TB) + (BALTACON)(TC) + (BALTAEUR)(TD) + (BALW)(TE)
(2)	TOTTRA	= (TRATOECON)(TA) + (TRATOEUR)(TB) + (TRATACON)(TC) + (TRATEAUR)(TD) + (TRAW)(TE)
(3)	TOTBLA	= (BLATOECON)(TA) + (BLATOEUR)(TB) + (BLATACON)(TC) + (BLATAEUR)(TD) + (BLAW)(TE)
(4)	TOTAP	= (APTOECON)(TA) + (APTOEUR)(TB)+ (APTACON)(TC) + (APTAEUR)(TD) + (APW)(TE)
(5)	TOTPEN	= (PENTOECON)(TA) + (PENTOEUR)(TB) + (PENTACON)(TC) + (PENTAEUR)(TD) + (PENW)(TE)
(6)	SHBAL	= TOTBAL - (BALW)(TE)

Equation No.		
(7)	SHTRA	= TOTTRA - (TRAW)(TE)
(8)	SHBLA	= TOTBLA - (BLAW)(TE)
(9)	SHAP	= TOTAP - (APW)(TE)
(10)	SHPEN	= TOTPEN - (PENW)(TE)
(11)	STBAL	= (BALW)(TE) + (F11)(SHBAL)
(12)	STTRA	= (TRAW)(TE) + (F11)(SHTRA)
(13)	STBLA	= (BLAW)(TE) + (F11)(SHBLA)
(14)	STAP	= (APW)(TE) + (F11)(SHAP)
(15)	STPEN	= (PENW)(TE) + (F11)(SHPEN)

Where TA, TB, TC, TD, and TE are defined as follows:

$$TA = TOECON + \frac{TOECOND}{3}$$

$$TB = TOEUR + \frac{TOEURD}{3}$$

$$TC = TACON + \frac{TACOND}{3}$$

$$TD = TAEUR + \frac{TAEURD}{3}$$

$$TE = TOECOND + TOEURD$$

(16)	GUNI	= (GUNIU)(GUNIP)
(17)	GUNS	= (GUNSU)(GUNSP)
(18)	MTI	= (MTIU)(MTIP)
(19)	MTS	= (MTSU)(MTSP)
(20)	FDTI	= (GUNIP)(F1I)
(21)	FDTS	= (GUNSP)(F1S)

Equation No.		
(22)	F2I	= (BALTOECON)(BALUP) + (TRATOECON)(TRAUP) + (BLATOECON)(BLAUP) + (APTOECON)(APUP) + (PENTOECON)(PENUP)
(23)	F3I	= (BALTACON)(BALUP) + (TRATACON)(TRAUP) + (BLATACON)(BLAUP) + (APTACON)(APUP) + (PENTACON)(PENUP)
(24)	F4I	= (BALTOEUR)(BALUP) + (TRATOEUR)(TRAUP) + (BLATOEUR)(BLAUP) + (APTOEUR)(APUP) + (PENTOEUR)(PENUP)
(25)	F5I	= (BALTAEUR)(BALUP) + (TRATAEUR)(TRAUP) + (BLATAEUR)(BLAUP) + (APTAEUR)(APUP) + (PENTAEUR)(PENUP)
(26)	F6I	= (BALW)(BALUW) + (TRAW)(TRAUW) + (BLAW)(BLAUW) + (APW)(APUW) + (PENW)(PENUW)
(27)	PAMMI	= (ATOECON)(F2I) + (ATACON)(F3I) + (ATOEUR)(F4I) + (ATAEUR)(F5I)
(28)	WAMMI	= (ATOECOND + ATOEURD)(F6I)
(29)	IPAMMI	= [(ATOECOND)(F2I) + (ATACOND)(F3I) + (ATOEURD)(F4I) + (ATAEURD)(F5I)] (1/3)
(30)	BP20MIP	= (TOECOND + TOEURD)(F10)
(31)	BP20MAR	= (TOECON + TOEUR)(F9)
(32)	BP20M	= BP20MIP + BP20MAR
(33)	BP20WIP	= (TOECOND + TOEURD)(F8)
(34)	BP20WAR	= (TOECON + TOEUR)(F7)
(35)	BP20W	= BP20WIP + BP20WAR
(36)	BP2000	= BP20W + BP20M
(37)	BP21MIP	= (TACOND + TAEURD)(F10)
(38)	BP21MAR	= (TACON + TAEUR)(F9)
(39)	BP21M	= BP21MIP + BP21MAR
(40)	BP21WIP	= (TACOND + TAEURD)(F8)
(41)	BP21WAR	= (TACON + TAEUR)(F7)

Equation No.		
(42)	BP21W	= BP21WIP + BP21WAR
(43)	BP2100	= BP21W + BP21M
(44)	BP22AR	= (TOTBAL)(FRBAL) + (TOTTRA)(FRTRA) + (TOTBLA)(FRBLA) + (TOTAP)(FRAP) + (TOTPEN)(FRPEN)
(45)	BP22ASH	= (SHBAL)(FSHBAL) + (SHTRA)(FSHTRA) + (SHBLA) (FSHBLA) + (SHAP)(FSHAP) + (SHPEN)(FSHPEN)
(46)	BP22AST	= (STBAL)(FSTBAL) + (STTRA)(FSTTRA) + (STBLA)(FSTBLA) + (STAP)(FSTAP) + (STPEN)(FSTPEN)
(47)	BP22A	= BP22AR + BP22AST + BP22ASH + BP22AOTH
(48)	BP2200	= BP22W + BP22A
(49)	BP22AREB	= [(BALW)(FMBAL) + (TRAW)(FMTRA) + (BLAW)(FMBLA) + (APW)(FMAP) + (PENW)(FMPEN)] (STOECOND + STOEURD)
(50)	BP23A	= BP23AREB + BP23AOTH
(51)	BP23WREB	= (REBILD)(F12)
(52)	BP23W	= BP23WREB + BP23WOTH
(53)	BP2300	= BP23W + BP23A
(54)	MPA	= (DINUSE)(F13)
(55)	RDI	= RDWI + RDMI + RDAI
(56)	RDS	= RDWS + RDMS + RDAS
(57)	RDTE	= RDI + RDS
(58)	PEMAWI	= PBSWI + GUNI + FDTI
(59)	AMMI	= PAMMI + WAMMI + IPAMMI
(60)	PEMAAI	= PBSAI + AMMI
(61)	PEMAI	= PEMAWI + MTI + PEMAAI
(62)	PEMAWS	= PBSWS + GUNS + FDTS
(63)	PEMAS	= PEMAWS + MTS + PBSAS
(64)	PEMA	= PEMAI + PEMAS
(65)	OMA	= BP2000 + BP2100 + BP2200 + BP2300
(66)	TOTALS	= RDTE + PEMA + OMA + MPA

3. Nomenclature for Data Names on Left Side of Cost Equations:

Note: Many of the data names used in the cost equations begin or end with a sequence of two or three letters used to designate each of the five different types of ammunition. These sequences of letters and the types of cartridges to which they refer are as follows:

BAL - Refers to "Ball" or HEIT ammunition

TRA - Refers to "Tracer" ammunition

(In this study, tracer ammunition is not considered as a separate type of cartridge but is included in the cost of other types, assuming a 4 to 1 ratio in belted ammunition.)

BLA - Refers to "Blank" or "Practice" ammunition

AP - Refers to "Armor Piercing" ammunition

PEN - Refers to ammunition

Equation No.	Data Name	Definition (Yearly Costs or Quantities)
1	TOTBAL)	
2	TOTTRA)	
3	TOTBLA)	-- Quantities of ammunition procured
4	TOTAP)	
5	TOTPEN)	
6	SHBAL)	
7	SHTRA)	
8	SHBLA)	-- Quantities of ammunition shipped
9	SHAP)	
10	SHPEN)	
11	STBAL)	
12	STTRA)	
13	STBLA)	-- Quantities of ammunition stored
14	STAP)	
15	STPEN)	
16	GUNI	Program cost for production of basic (interim)weapons

Equation No.	Data Name	Definition (Yearly Costs or Quantities)
17	GUNS	Same as above for successor weapons
18	MTI	Program costs for production of interim system mounts and associated equipment hardware peculiar to interim system. These include installation and FDT costs, if any.
19	MTS	Same as above for successor system. This also includes labor and overhead costs for retrofit to the successor system.
20	FDTI	First Destination Transportation costs for production quantity of interim weapons.
21	FDTS	Same as above for successor weapons
22	F2I	Average cost of ammunition expended per interim weapon on TOE tanks in CONUS during peacetime training.
23	F3I	Same as above for interim weapons on TA tanks in CONUS
24	F4I	Same as above for interim weapons on TOE tanks in Europe
25	F5I	Same as above for interim weapons on TA tanks in Europe
26	F6I	Average cost of ammunition expended per interim weapon on TOE tanks during wartime for war reserve time frame
27	PAMMI	Program cost for production of peacetime training ammunition for the interim weapon system
28	WAMMI	Program cost for production of war reserve ammunition for the interim system
29	IPAMMI	Program cost for production of initial provisioning ammunition for the interim system
30	BP20MIP	Initial provisioning parts costs for interim mount on TOE tanks
31	BP20MAR	Annual replenishment parts costs for interim mounts on all TOE tanks (for lower four echelons of maintenance)

Equation No.	Data Name	Definition (Yearly Costs or Quantities)
32	BP20M	Cost for parts to maintain the interim gun mounts on TOE tanks for the four lower echelons of maintenance
33	BP20WIP	Initial provisioning parts costs for interim weapons on TOE tanks
34	BP20WAR	Annual replenishment parts costs for interim weapons on all TOE tanks (for lower four echelons of maintenance)
35	BP20W	Cost for parts to maintain the interim guns on TOE tanks for the lower four echelons of maintenance
36	BP2000	Cost of parts to maintain the interim systems (guns and mounts) on TOE tanks for the four lower echelons of maintenance
37	BP21MIP)	
38	BP21MAR)	
39	BP21M)	Same as the corresponding BP20--- data names
40	BP21WIP) --	shown above except that these refer to maintenance
41	BP21WAR)	parts costs for interim guns and mounts on TA tanks
42	BP21W)	rather than TOE tanks
43	BP2100)	
44	BP22AR	Costs to "receive" ammunition
45	BP22ASH	Costs to "ship" ammunition
46	BP22AST	Costs to "store" ammunition
47	BP22A	Central Supply costs for ammunition
48	BP2200	Central Supply costs for interim weapon system (i.e., procurement and supply activities)
49	BP23AREB	Costs for reconditioning and maintenance of ammunition in storage
50	BP23A	Costs for Depot Maintenance and maintenance support activities
51	BP23WREB	Rebuild cost for weapon system
52	BP23W	Costs for Depot Maintenance and maintenance support activities for the interim weapon system (exclusive of ammunition)
53	BP2300	Costs for Depot Maintenance and maintenance support activities for the complete interim weapon system

Equation No.	Data Name	Definition (Yearly Costs or Quantities)
54	MPA	Military Personnel costs for field and organizational maintenance (i.e., four lower echelons) of the interim weapon system on TOE and TA tanks
55	RDI	Total RDTE costs for the interim system
56	RDS	Total RDTE costs for the successor system
57	RDTE	Total RDTE costs (yearly)
58	PEMAWI	Total PEMA costs for interim weapon
59	AMMI	Total program cost for production of interim ammunition
60	PEMAAI	Total PEMA cost for interim ammunition
61	PEMAI	Total PEMA cost for interim system
62	PEMAWS	Total PEMA cost for successor weapon
63	PEMAS	Total PEMA cost for successor system
64	PEMA	Total PEMA costs (yearly)
65	OMA	Total OMA costs (yearly)
66	TOTALS	Totals of all costs (yearly)

4. Input Data Names and Definitions:

Item	Data Name	Definition
1	RDWI	Yearly program RDTE costs for interim weapon
2	RDWS	Same as above for successor weapon
3	RDMI	Same as above for interim mount
4	RDMS	Same as above for successor mount
5	RDAI	Same as above for interim ammunition
6	RDAS	Same as above for successor ammunition
7	PBSWI	Yearly program Production Base Support costs for interim weapon (includes PBS costs for interim mount)

Item	Data Name	Definition
8	PBSWS	Same as above for successor weapon
9	PBSAI	Same as above for interim ammunition
10	PBSAS	Same as above for successor ammunition
11	GUNIU	Yearly average unit production cost of interim weapon
12	GUNSU	Same as above for successor weapon
13	MTIU	Same as above for interim mount
14	MTSU	Same as above for successor mount
15	F1I	Average First Destination Transportation cost per interim weapon
16	F1S	Same as above for successor weapon
17	F7	Average yearly cost of annual replenishment parts for one interim weapon (for four lower echelons of maintenance)
18	F8	Average yearly cost of initial provisioning parts for one interim weapon
19	F9	Same as for F7 but for one interim mount
20	F10	Same as for F8 but for one interim mount
21	BP22W	Yearly central supply costs for the interim weapon system exclusive of ammunition
22	BP23WOTH	Yearly BP2300 costs, exclusive of rebuild, for interim weapon system
23	F12	Average cost to overhaul, rebuild and modify (if necessary) one interim weapon
24	F13	Average yearly military labor maintenance costs per weapon system, for the four lower echelons of maintenance
25	BALUP)	
26	TRAUP)	
27	BLAUP) --	Average unit cartridge costs for peacetime training
28	APUP)	
29	PENUP)	

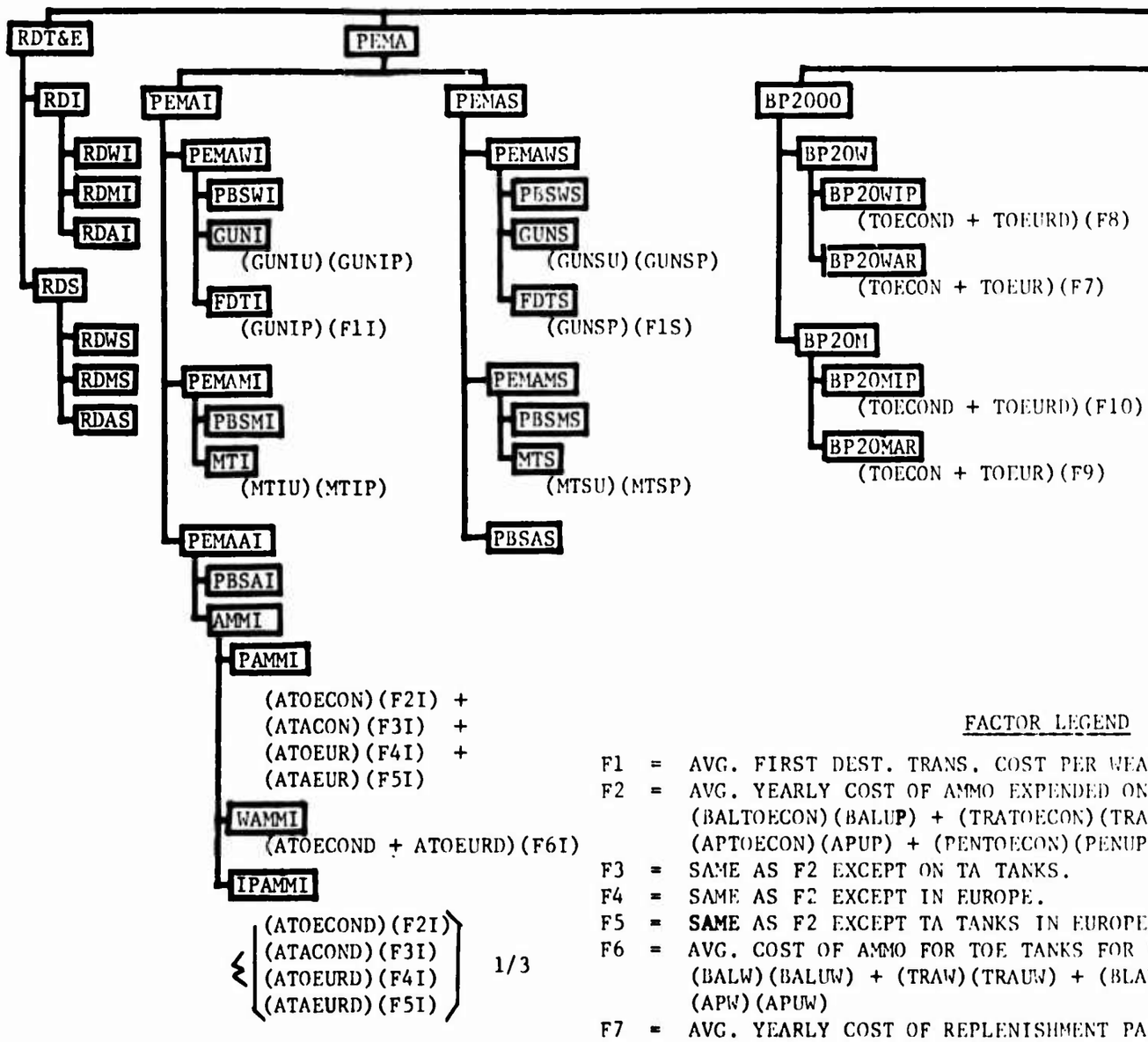
Item	Data Name	Definition
30	BALUW)	
31	TRAUW)	
32	BLAUW)	-- Average unit cartridge costs for war reserve
33	APUW)	
34	PENUW)	
35	BP22AOTH	Yearly BP2200 "other" costs for ammunition (i.e., miscellaneous procurement and supply costs not considered elsewhere)
36	BP23AOTH	Yearly BP2300 "other" costs for ammunition not considered elsewhere
37	FRBAL)	
38	FRTRA)	
39	FRBLA)	-- Cost to "receive" one cartridge of ammunition
40	FRAP)	
41	FRPEN)	
42	FSTBAL)	
43	FSTTRA)	
44	FSTBLA)	-- Cost to "store" one cartridge of ammunition
45	FSTAP)	
46	FSTPEN)	
47	FSHBAL)	
48	FSHTRA)	
49	FSHBLA)	-- Cost to "ship" one cartridge of ammunition
50	FSHAP)	
51	FSHPEN)	
52	FMBAL)	
53	FMTRA)	
54	FMBLA)	-- Cost to "maintain" in storage one cartridge of ammunition
55	FMAP)	
56	FMPEN)	
57	F11	Fraction of all ammunition, other than war reserve ammunition, which is to be "stored" previous to shipment for Army use
58	GUNIP	Yearly program production quantity of interim weapon
59	GUNSP	Same as above for successor

Item	Data Name	Definition
60	MTIP	Yearly program production quantity of interim mount
61	MTSP	Same as above for successor
62	TOECON	Average quantity of TOE tanks in CONUS
63	TACON	Average quantity of TA tanks in CONUS
64	TOEUR	Average quantity of TOE tanks in Europe
65	TAEUR	Average quantity of TA tanks in Europe
66	REBILD	Quantity of interim weapons to be rebuilt and modified at maintenance depots
67	DINUSE	Average yearly total of in-use-density tanks (i.e., to sum of TOE and TA tanks in the field)
68	TOECOND)	
69	TACOND)	-- Yearly deliveries of tanks as described in items 62-65 above
70	TOEURD)	
71	TAEURD)	
72	BALW)	
73	TRAW)	
74	BLAW)	-- Wartime ammunition usage rates (Rounds per weapon per war reserve time frame - i.e., 3 months)
75	APW)	
76	PENW)	
77	BALTOECON)	
78	BALTOEUR)	-- Peacetime training usage rates for "ball" or "HEIT" ammunition for TOE and TA tanks in CONUS and Europe
79	BALTACON)	
80	BALTAEUR)	
81	TRATOECON)	
82	TRATOEUR)	- Same as above for "tracer" ammunition
83	TRATACON)	
84	TRATAEUR)	
85	BLATOECON)	
86	BLATOEUR)	- Same as above for "blank" ammunition
87	BLATACON)	
88	BLATEAUR)	
89	APTOECON)	
90	APTOEUR)	- Same as above for "AP" (armor piercing) ammunition
91	APTACON)	
92	APTAEUR)	

Item	Data Name		Definition
93	PENTOECON)		
94	PENTOEUR)	--	Same as above for the ammunition
95	PENTACON)		
96	PENTAEUR)		
97	ATOECON)		
98	ATACON)		
99	ATOEUR)		Same as items 62-65 and items 68-71, except
100	ATAEUR)	--	that the quantities are moved back one year
101	ATOECOND)		(This is to permit ammunition production costs
102	ATACOND)		to be programmed one year prior to production.)
103	ATOEURD)		
104	ATAEURD)		
105	STOECOND		Yearly cumulative quantities of TOE tanks delivered to CONUS
106	STOEURD		Yearly cumulative quantities of TOE tanks delivered to EUROPE

5. Flow Chart of Cost Model:

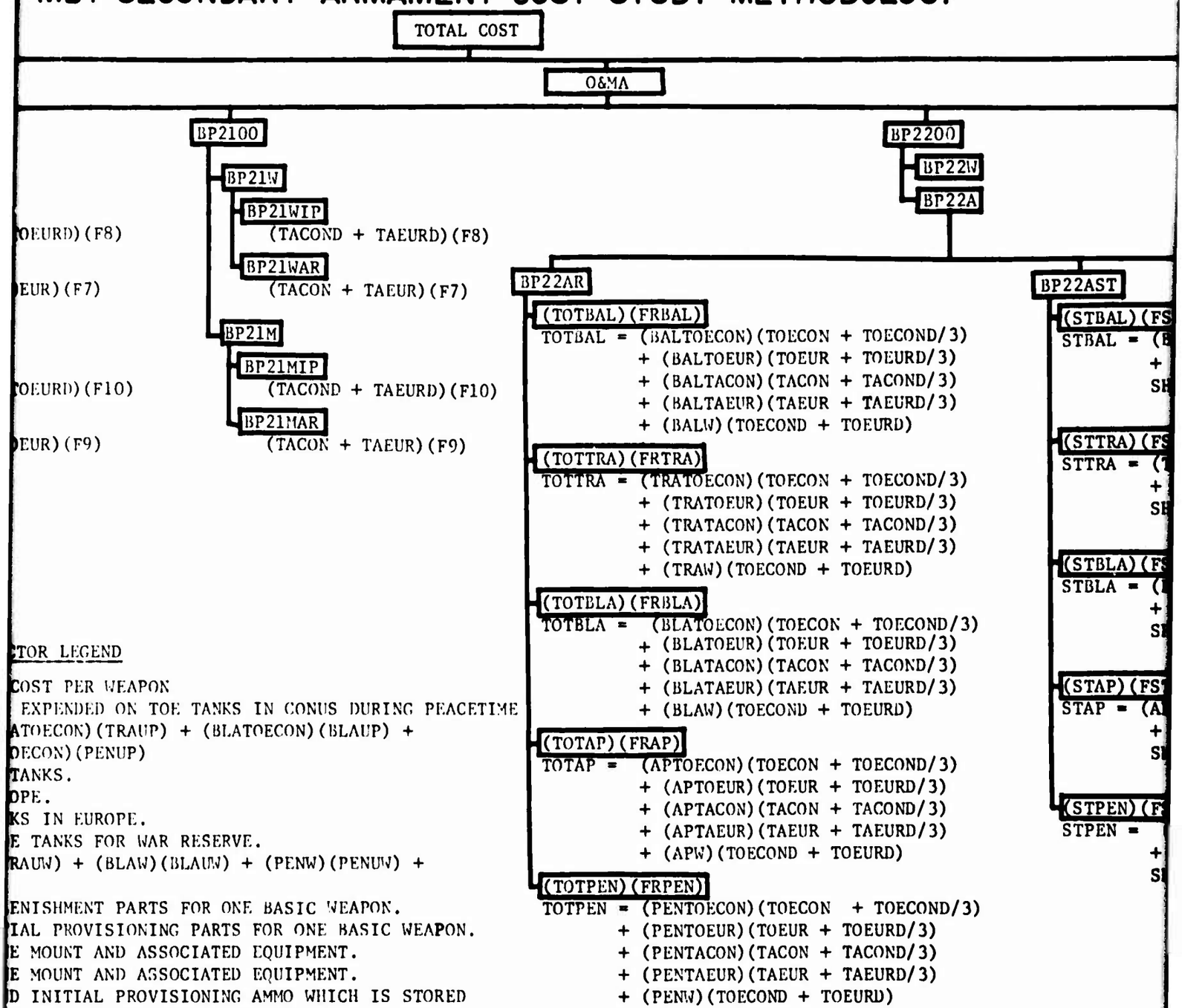
For clarification, a pictorial presentation of the cost model is illustrated on the next page. This flow chart illustrates the inter-relationships among the 106 inputs and 66 equations and the manner in which each of these contributes to the total cost shown at the top of the chart.



FACTOR LEGEND

F1 = AVG. FIRST DEST. TRANS. COST PER WEAPON
F2 = AVG. YEARLY COST OF AMMO EXPENDED ON TOE
(BALTOECON)(BALUP) + (TRATOECON)(TRAUP) +
(APTOECON)(APUP) + (PENTOECON)(PENUP)
F3 = SAME AS F2 EXCEPT ON TA TANKS.
F4 = SAME AS F2 EXCEPT IN EUROPE.
F5 = SAME AS F2 EXCEPT TA TANKS IN EUROPE.
F6 = AVG. COST OF AMMO FOR TOE TANKS FOR WAR R
(BALW)(BALUW) + (TRAW)(TRAUW) + (BLAW)(BL
(APW)(APUW)
F7 = AVG. YEARLY COST OF REPLENISHMENT PARTS F
F8 = AVG. YEARLY COST OF INITIAL PROVISIONING
F9 = SAME AS F7 EXCEPT FOR ONE MOUNT AND ASSOC
F10 = SAME AS F8 EXCEPT FOR ONE MOUNT AND ASSOC
F11 = FRACTION OF PEACETIME AND INITIAL PROVISI
BEFORE SHIPPING.
F12 = AVG. COST TO OVERHAUL AND REBUILD ONE WEA
F13 = AVG. YEARLY MILITARY LABOR MAINTENANCE CO

MBT SECONDARY ARMAMENT COST STUDY METHODOLOGY



OEURD)(F8)

EUR)(F7)

OEURD)(F10)

EUR)(F9)

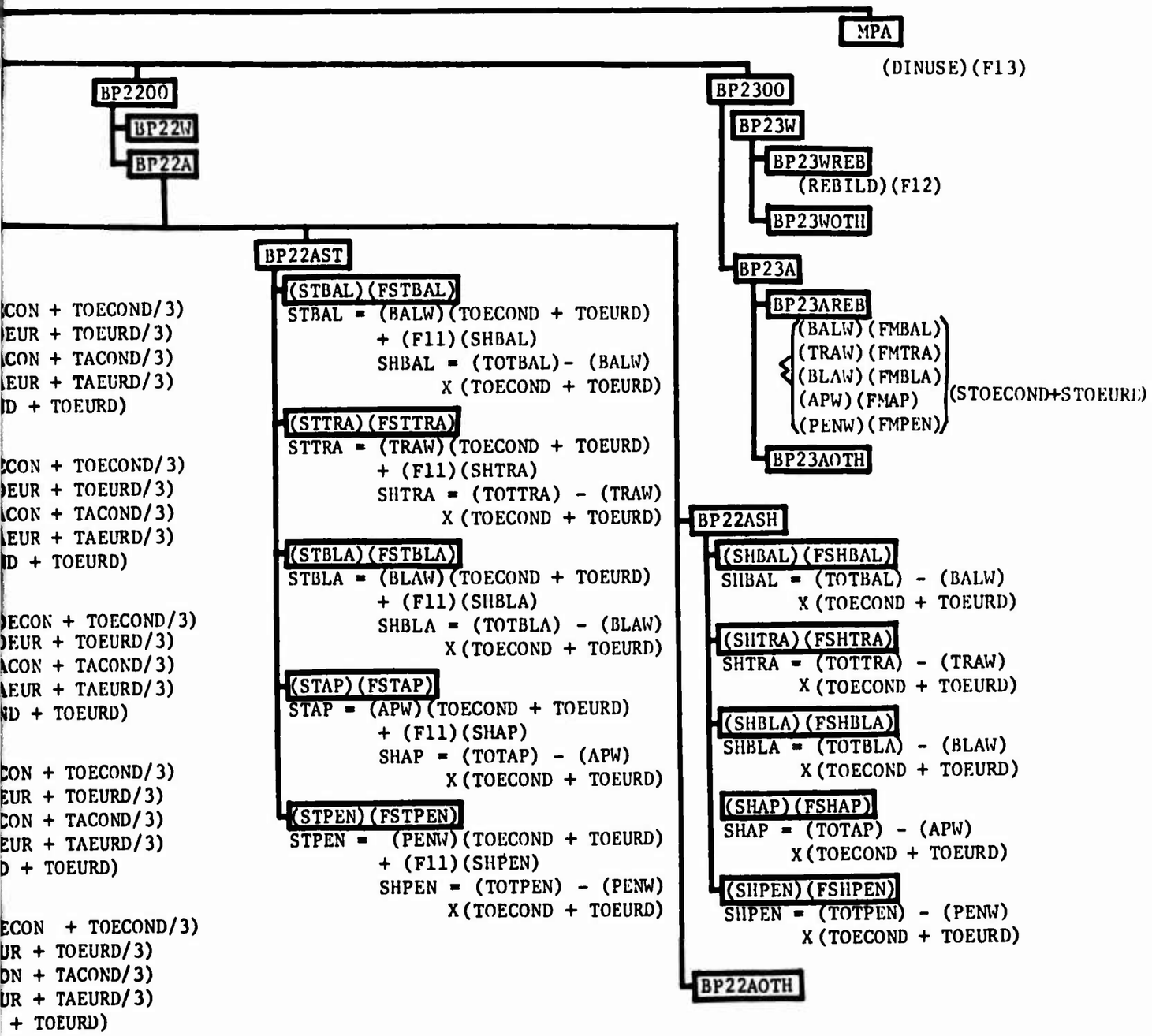
CTOR LEGEND

COST PER WEAPON
EXPENDED ON TOE TANKS IN CONUS DURING PEACETIME
ATOECON)(TRAUP) + (BLATOECON)(BLAUP) +
OECON)(PENUP)
TANKS.
OPE.
KS IN EUROPE.
E TANKS FOR WAR RESERVE.
RAUW) + (BLAW)(BLAUW) + (PENW)(PENUW) +

ENISHMENT PARTS FOR ONE BASIC WEAPON.
IAL PROVISIONING PARTS FOR ONE BASIC WEAPON.
E MOUNT AND ASSOCIATED EQUIPMENT.
E MOUNT AND ASSOCIATED EQUIPMENT.
D INITIAL PROVISIONING AMMO WHICH IS STORED

D REBUILD ONE WEAPON.
OR MAINTENANCE COST PER WEAPON.

HODOLOGY


MPA
(DINUSE)(F13)
BP2200
BP22W
BP22A
BP2300
BP23W
BP23WREB
(REBILD)(F12)
BP23WOTH
BP23A
BP23AREB
(BALW)(FMBAL)
(TRAW)(FMTRA)
(BLAW)(FMBLA)
(APW)(FMAP)
(PENW)(FMPEN)
(STOECOND+STOEURD)
BP23AOTH
BP22AST
(STBAL)(FSTBAL)
STBAL = (BALW)(TOECOND + TOEURD)
+ (F11)(SHBAL)
SHBAL = (TOTBAL)- (BALW)
X (TOECOND + TOEURD)
(STTRA)(FSTTRA)
STTRA = (TRAW)(TOECOND + TOEURD)
+ (F11)(SHTRA)
SHTRA = (TOTTRA) - (TRAW)
X (TOECOND + TOEURD)
(STBLA)(FSTBLA)
STBLA = (BLAW)(TOECOND + TOEURD)
+ (F11)(SHBLA)
SHBLA = (TOTBLA) - (BLAW)
X (TOECOND + TOEURD)
(STAP)(FSTAP)
STAP = (APW)(TOECOND + TOEURD)
+ (F11)(SHAP)
SHAP = (TOTAP) - (APW)
X (TOECOND + TOEURD)
(STPEN)(FSTPEN)
STPEN = (PENW)(TOECOND + TOEURD)
+ (F11)(SHPEN)
SHPEN = (TOTPEN) - (PENW)
X (TOECOND + TOEURD)
BP22ASH
(SHBAL)(FSHBAL)
SHBAL = (TOTBAL) - (BALW)
X (TOECOND + TOEURD)
(SHTRA)(FSHTRA)
SHTRA = (TOTTRA) - (TRAW)
X (TOECOND + TOEURD)
(SHBLA)(FSHBLA)
SHBLA = (TOTBLA) - (BLAW)
X (TOECOND + TOEURD)
(SHAP)(FSHAP)
SHAP = (TOTAP) - (APW)
X (TOECOND + TOEURD)
(SHPEN)(FSHPEN)
SHPEN = (TOTPEN) - (PENW)
X (TOECOND + TOEURD)
BP22AOTH
CON + TOECOND/3)
EUR + TOEURD/3)
CON + TACOND/3)
EUR + TAEURD/3)
D + TOEURD)
CON + TOECOND/3)
EUR + TOEURD/3)
CON + TACOND/3)
EUR + TAEURD/3)
D + TOEURD)
ECON + TOECOND/3)
EUR + TOEURD/3)
CON + TACOND/3)
EUR + TAEURD/3)
D + TOEURD)
CON + TOECOND/3)
EUR + TOEURD/3)
CON + TACOND/3)
EUR + TAEURD/3)
D + TOEURD)
ECON + TOECOND/3)
UR + TOEURD/3)
ON + TACOND/3)
UR + TAEURD/3)
+ TOEURD)

COMPUTER PROGRAM

AND

SAMPLE PRINTOUTS

```
$JOB            0194007   AWCOR-SD

$TIME           10

$PAGE           100

$EXECUTE        WATFOR

          $IBJOB
          $IBFTC COSTFC
          C      SECONDARY ARMAMENT COST STUDY -- COST ANALYSIS/OPS. RESEARCH 10/67
     1            DIMENSION DIN(106,10),DLAB(106,4),DOUT(66,10),CASE(20),
                 1 TOTALS(15,5),LAB(9),LINE(10),OLAB(66,4),CASENR(15,4)
     2            READ 1,NCASE,((OLAB(I,J),J=1,4),I=1,66)
     3           1 FORMAT (I5/(20A4))
     4            IYEAR=68
     5            DO 2 I=1,9
     6           2 LAB(I)=IYEAR+I-1
     7            DO 3 ICASE=1,NCASE
    10            READ 4,CASE
    11           4 FORMAT (20A4)
    12            DO 5 I=1,106
    13            READ 6,IFLAG,(DLAB(I,J),J=1,4),(DIN(I,J),J=1,9)
    14           6 FORMAT (I1,3A3,A2,5X9F7.0)
          C      THIS ZERO-LOGIC IS NECESSARY BECAUSE BLANK IS READ AS A -0.
    15            DO 34 J=1,9
    16            IF (DIN(I,J))34,35,34
    17           35 DIN(I,J)=0.
    20           34 CONTINUE
    21            IF (IFLAG)7,5,7
    22           7 TEMP=DIN(I,1)
    23            DO 8 J=2,9
    24            IF (DIN(I,J))8,9,8
    25           9 DIN(I,J)=TEMP
    26           8 TEMP=DIN(I,J)
    27           5 CONTINUE
    30            PRINT 10,CASE,LAB
    31           10 FORMAT (1H1,20A4,2X27HINPUT DATA COSTS IN DOLLARS
                   1 /1H0,4X,7HITEM/FY,9I12)
    32            PRINT 11,((DLAB(I,J),J=1,4),(DIN(I,J),J=1,9),I=1,56)
    33           11 FORMAT (1H ,3A3,A2,9F12.3)
    34            PRINT 12,CASE,LAB
    35           12 FORMAT (1H1,20A4,2X,20HINPUT DATA-FRACTION
                   1 /1H0,4X,7HITEM/FY  ,9I12)
    36            PRINT 13,(DLAB(57,J),J=1,4),(DIN(57,J),J=1,9)
    37           13 FORMAT (1H ,3A3,A2,9F12.3)
    40            PRINT 14
    41           14 FORMAT (1H0,85X,10HQUANTITIES/)
    42            DO 15 I=58,106
    43            DO 16 J=1,9
    44           16 LINE(J)=DIN(I,J)+.5
    45           15 PRINT 17,(DLAB(I,J),J=1,4),(LINE(J),J=1,9)
    46           17 FORMAT (1H ,3A3,A2,9I12)
          C
          C      BEGIN EQUATIONS
          C
```

```
47          DO 20 J=1,5
50        20 TOTALS(ICASE,J)=0.
51          DO 31 I=1,106
52          DIN(I,10)=0.
53          DO 31 J=1,9
54        31 DIN(I,10)=DIN(I,10)+DIN(I,J)
55          DO 19 J=1,9
56          TA=DIN(62,J)+DIN(68,J)/3.
57          TB=DIN(64,J)+DIN(70,J)/3.
60          TC=DIN(63,J)+DIN(69,J)/3.
61          TD=DIN(65,J)+DIN(71,J)/3.
62          TE=DIN(68,J)+DIN(70,J)
63          DOUT(1,J)=DIN(77,J)*TA+DIN(78,J)*TB+DIN(79,J)*TC+DIN(80,J)*TD
           1 +DIN(72,J)*TE
64          DOUT(2,J)=DIN(81,J)*TA+DIN(82,J)*TB+DIN(83,J)*TC+DIN(84,J)*TD
           1 +DIN(73,J)*TE
65          DOUT(3,J)=DIN(85,J)*TA+DIN(86,J)*TB+DIN(87,J)*TC+DIN(88,J)*TD
           1 +DIN(74,J)*TE
66          DOUT(4,J)=DIN(89,J)*TA+DIN(90,J)*TB+DIN(91,J)*TC+DIN(92,J)*TD
           1 +DIN(75,J)*TE
67          DOUT(5,J)=DIN(93,J)*TA+DIN(94,J)*TB+DIN(95,J)*TC+DIN(96,J)*TD
           1 +DIN(76,J)*TE
70          TA=DIN(68,J)+DIN(70,J)
71          DOUT(6,J)=DOUT(1,J)-DIN(72,J)*TA
72          DOUT(7,J)=DOUT(2,J)-DIN(73,J)*TA
73          DOUT(8,J)=DOUT(3,J)-DIN(74,J)*TA
74          DOUT(9,J)=DOUT(4,J)-DIN(75,J)*TA
75          DOUT(10,J)=DOUT(5,J)-DIN(76,J)*TA
76          DOUT(11,J)=DIN(72,J)*TA+DIN(57,J)*DOUT(6,J)
77          DOUT(12,J)=DIN(73,J)*TA+DIN(57,J)*DOUT(7,J)
100         DOUT(13,J)=DIN(74,J)*TA+DIN(57,J)*DOUT(8,J)
101         DOUT(14,J)=DIN(75,J)*TA+DIN(57,J)*DOUT(9,J)
102         DOUT(15,J)=DIN(76,J)*TA+DIN(57,J)*DOUT(10,J)
103         DOUT(16,J)=DIN(11,J)*DIN(58,J)
104         DOUT(17,J)=DIN(12,J)*DIN(59,J)
105         DOUT(18,J)=DIN(13,J)*DIN(60,J)
106         DOUT(19,J)=DIN(14,J)*DIN(61,J)
107         DOUT(20,J)=DIN(58,J)*DIN(15,J)
110         DOUT(21,J)=DIN(59,J)*DIN(16,J)
111         DOUT(22,J)=DIN(77,J)*DIN(25,J)+DIN(81,J)*DIN(26,J)
           1 +DIN(85,J)*DIN(27,J)+DIN(89,J)*DIN(28,J)+DIN(93,J)*DIN(29,J)
112         DOUT(23,J)=DIN(79,J)*DIN(25,J)+DIN(83,J)*DIN(26,J)
           1 +DIN(87,J)*DIN(27,J)+DIN(91,J)*DIN(28,J)+DIN(95,J)*DIN(29,J)
113         DOUT(24,J)=DIN(78,J)*DIN(25,J)+DIN(82,J)*DIN(26,J)
           1 +DIN(86,J)*DIN(27,J)+DIN(90,J)*DIN(28,J)+DIN(94,J)*DIN(29,J)
114         DOUT(25,J)=DIN(80,J)*DIN(25,J)+DIN(84,J)*DIN(26,J)
           1 +DIN(88,J)*DIN(27,J)+DIN(92,J)*DIN(28,J)+DIN(96,J)*DIN(29,J)
115         DOUT(26,J)=DIN(72,J)*DIN(30,J)+DIN(73,J)*DIN(31,J)
           1 +DIN(74,J)*DIN(32,J)+DIN(75,J)*DIN(33,J)+DIN(76,J)*DIN(34,J)
116         DOUT(27,J)=DIN(97,J)*DOUT(22,J)+DIN(98,J)*DOUT(23,J)
           1 +DIN(99,J)*DOUT(24,J)+DIN(100,J)*DOUT(25,J)
117         DOUT(28,J)=(DIN(101,J)+DIN(103,J))*DOUT(26,J)
120         DOUT(29,J)=(DIN(101,J)*DOUT(22,J)+DIN(102,J)*DOUT(23,J)
           1 +DIN(103,J)*DOUT(24,J)+DIN(104,J)*DOUT(25,J))/3.
121         TB=DIN(62,J)+DIN(64,J)
122         DOUT(30,J)=TA*DIN(20,J)
123         DOUT(31,J)=TB*DIN(19,J)
124         DOUT(32,J)=DOUT(30,J)+DOUT(31,J)
125         DOUT(33,J)=TA*DIN(18,J)
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126          DOUT(34,J)=TB*DIN(17,J)
127          DOUT(35,J)=DOUT(33,J)+DOUT(34,J)
130          DOUT(36,J)=DOUT(35,J)+DOUT(32,J)
131          TA=DIN(69,J)+DIN(71,J)
132          TB=DIN(63,J)+DIN(65,J)
133          DOUT(37,J)=TA*DIN(20,J)
134          DOUT(38,J)=TB*DIN(19,J)
135          DOUT(39,J)=DOUT(37,J)+DOUT(38,J)
136          DOUT(40,J)=TA*DIN(18,J)
137          DOUT(41,J)=TB*DIN(17,J)
140          DOUT(42,J)=DOUT(40,J)+DOUT(41,J)
141          DOUT(43,J)=DOUT(42,J)+DOUT(39,J)
142          DOUT(44,J)=DOUT(1,J)*DIN(37,J)+DOUT(2,J)*DIN(38,J)
            1 +DOUT(3,J)*DIN(39,J)+DOUT(4,J)*DIN(40,J)+DOUT(5,J)*DIN(41,J)
143          DOUT(45,J)=DOUT(6,J)*DIN(47,J)+DOUT(7,J)*DIN(48,J)
            1 +DOUT(8,J)*DIN(49,J)+DOUT(9,J)*DIN(50,J)+DOUT(10,J)*DIN(51,J)
144          DOUT(46,J)=DOUT(11,J)*DIN(42,J)+DOUT(12,J)*DIN(43,J)
            1 +DOUT(13,J)*DIN(44,J)+DOUT(14,J)*DIN(45,J)+DOUT(15,J)*DIN(46,J)
145          DOUT(47,J)=DOUT(44,J)+DOUT(46,J)+DOUT(45,J)+DIN(35,J)
146          DOUT(48,J)=DIN(21,J)+DOUT(47,J)
147          DOUT(49,J)=(DIN(72,J)*DIN(52,J)+DIN(73,J)*DIN(53,J)
            1 +DIN(74,J)*DIN(54,J)+DIN(75,J)*DIN(55,J)+DIN(76,J)*DIN(56,J))
            2 *(DIN(105,J)+DIN(106,J))
150          DOUT(50,J)=DOUT(49,J)+DIN(36,J)
151          DOUT(51,J)=DIN(66,J)*DIN(23,J)
152          DOUT(52,J)=DOUT(51,J)+DIN(22,J)
153          DOUT(53,J)=DOUT(52,J)+DOUT(50,J)
154          DOUT(54,J)=DIN(67,J)*DIN(24,J)
155          DOUT(55,J)=DIN(1,J)+DIN(3,J)+DIN(5,J)
156          DOUT(56,J)=DIN(2,J)+DIN(4,J)+DIN(6,J)
157          DOUT(57,J)=DOUT(55,J)+DOUT(56,J)
160          DOUT(58,J)=DIN(7,J)+DOUT(16,J)+DOUT(20,J)
161          DOUT(59,J)=DOUT(27,J)+DOUT(28,J)+DOUT(29,J)
162          DOUT(60,J)=DIN(9,J)+DOUT(59,J)
163          DOUT(61,J)=DOUT(58,J)+DOUT(18,J)+DOUT(60,J)
164          DOUT(62,J)=DIN( 8,J)+DOUT(17,J)+DOUT(21,J)
165          DOUT(63,J)=DOUT(62,J)+DOUT(19,J)+DIN(10,J)
166          DOUT(64,J)=DOUT(61,J)+DOUT(63,J)
167          DOUT(65,J)=DOUT(36,J)+DOUT(43,J)+DOUT(48,J)+DOUT(53,J)
170       19 DOUT(66,J)=DOUT(57,J)+DOUT(64,J)+DOUT(65,J)+DOUT(54,J)
171          DO 18 I=1,66
172          DOUT(I,10)=0.
173          DO 18 J=1,9
174       18 DOUT(I,10)=DOUT(I,10)+DOUT(I,J)
175          TOTALS(ICASE,1)=TOTALS(ICASE,1)+DOUT(57,10)
176          TOTALS(ICASE,2)=TOTALS(ICASE,2)+DOUT(64,10)
177          TOTALS(ICASE,3)=TOTALS(ICASE,3)+DOUT(65,10)
200          TOTALS(ICASE,4)=TOTALS(ICASE,4)+DOUT(54,10)
201          TOTALS(ICASE,5)=TOTALS(ICASE,5)+DOUT(66,10)
202          PRINT 21,CASE,LAB
203       21 FORMAT (1H120A4,2X30HOUTPUT OF EQUATIONS-QUANTITIES
            1 /1H0BX7HITEM/FY1X9I10,3X10HROW TOTALS/)
204          DO 22 I=1,15
205          DO 23 J=1,10
206       23 LINE(J)=DOUT(I,J)+.5
207       22 PRINT 24,(OLAB(I,J),J=1,4),LINE
210       24 FORMAT (1H 4A4,9I10,I13)
211          PRINT 25,CASE,LAB,((OLAB(I,J),J=1,4),(DOUT(I,J),J=1,10),I=16,66)
212       25 FORMAT (1H120A4,1X38HOUTPUT OF EQUATIONS-COSTS IN THOUSANDS
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     1 /1H0,8X,7HITEM/FY,1X,9I10,3X,10HROW TOTALS//(1H 4A4,-3P9F10.3,F13.3))
213        PRINT 26,CASE,LAB
214     26 FORMAT (1H1,20A4,2X,18HCOSTS IN THOUSANDS
           1/1H0,8X,7HITEM/FY  9I10,3X,10HROW TOTALS)
215        PRINT 27,(DIN(1,J),J=1,10),(DIN(3,J),J=1,10),(DIN(5,J),J=1,10),
           1 (DOUT(55,J),J=1,10),(DIN(2,J),J=1,10),(DIN(4,J),J=1,10),
           2 (DIN(6,J),J=1,10),(DOUT(56,J),J=1,10),(DOUT(57,J),J=1,10)
216     27 FORMAT (5H RDTE/1H 7X,8HWEAPON-I-3P9F10.3,F13.3/1H 8X,7HMOUNT-I
           1 9F10.3,F13.3/1H 9X,6HAMMO-I9F10.3,F13.3/1H 8X,7HTOTAL-I9F10.3,F13.3
           2 /1H07X,8HWEAPON-S9F10.3,F13.3/1H 8X,7HMOUNT-S9F10.3,F13.3/1H 9X
           3 6HAMMO-S9F10.3,F13.3/1H 8X,7HTOTAL-S9F10.3,F13.3/1H05X
           4 10HTOTAL RDTE9F10.3,F13.3)
217        PRINT 28,(DOUT(58,J),J=1,10),(DOUT(18,J),J=1,10),
           1 (DOUT(60,J),J=1,10),(DOUT(61,J),J=1,10),
           2 (DOUT(62,J),J=1,10),(DOUT(19,J),J=1,10),(DIN(10,J),J=1,10),
           3 (DOUT(63,J),J=1,10),(DOUT(64,J),J=1,10)
220     28 FORMAT (/5HOPEMA/1H 7X,8HWEAPON-I-3P9F10.3,F13.3/1H 8X,7HMOUNT-I
           1 9F10.3,F13.3/1H 9X,6HAMMO-I9F10.3,F13.3/1H 8X,7HTOTAL-I9F10.3,F13.3
           2 /1H07X,8HWEAPON-S9F10.3,F13.3/1H 8X,7HMOUNT-S9F10.3,F13.3/1H 9X
           3 6HAMMO-S9F10.3,F13.3/1H 8X,7HTOTAL-S9F10.3,F13.3/1H 5X
           4 10HTOTAL PEMA9F10.3,F13.3)
221        PRINT 29,(DOUT(35,J),J=1,10),(DOUT(32,J),J=1,10),
           1 (DOUT(36,J),J=1,10),(DOUT(42,J),J=1,10),(DOUT(39,J),J=1,10),
           2 (DOUT(43,J),J=1,10),(DIN(21,J),J=1,10),(DOUT(47,J),J=1,10),
           3 (DOUT(48,J),J=1,10)
222     29 FORMAT (/4HOOMA/1HO2X,6HBP2000/1H 9X,6HWEAPON-3P9F10.3,F13.3/1H 10X
           1 5HMOUNT9F10.3,F13.3/1H 10X,5HTOTAL9F10.3,F13.3/1HO2X,6HBP2100/1H
           2 9X,6HWEAPON9F10.3,F13.3/1H 10X,5HMOUNT9F10.3,F13.3/1H 10X,5HTOTAL
           3 9F10.3,F13.3/1HO2X,6HBP2200/1H 5X,10HWEAPON/MT.9F10.3,F13.3/1H 11X
           3 4HAMMO9F10.3,F13.3/1H 10X,5HTOTAL9F10.3,F13.3)
223        PRINT 30,(DOUT(52,J),J=1,10),(DOUT(50,J),J=1,10),
           1 (DOUT(53,J),J=1,10),(DOUT(65,J),J=1,10),(DOUT(54,J),J=1,10),
           2 (DOUT(66,J),J=1,10)
224     30 FORMAT (1HO2X,6HBP2300/1H 5X,10HWEAPON/MT.-3P9F10.3,F13.3/1H 11X
           1 4HAMMO9F10.3,F13.3/1H 10X,5HTOTAL9F10.3,F13.3/1HO6X,10HTOTAL OMA
           2 9F10.3,F13.3//4HOMPA12X9F10.3,F13.3/13HOGRAND TOTALS3X9F10.3,
           3 F13.3)
225        DO 32 J=1,4
226     32 CASENR(ICASE,J)=CASE(J)
227      3 CONTINUE
230        PRINT 33,((CASENR(ICASE,J),J=1,4),(TOTALS(ICASE,J),J=1,5),
           1 ICASE=1,NCASE)
231     33 FORMAT (1H1,10X,26HSUMMARY COSTS IN THOUSANDS/1HO,11X,4HCASE,17X,4HRDTE
           1 16X,4HPEMA,17X,3HOMA,17X,3HMPA,15X,5HTOTAL/(1HO,4A4,-3P5F20.3))
232        CALL EXIT
233        END
$ENTRY
```

CASE 2 [illegible] ARMAMENT STUDY COSTS IN THOUSANDS

	FY 1971	72	73	74	75	76	77	78	79	ROW TOTALS
RDTE										
WEAPON-I	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MOUNT-I	250.000	500.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	750.000
AMMO-I	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL-I	250.000	500.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	750.000
WEAPON-S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MOUNT-S	0.000	0.000	0.000	750.000	500.000	0.000	0.000	0.000	0.000	1250.000
AMMO-S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL-S	0.000	0.000	0.000	750.000	500.000	0.000	0.000	0.000	0.000	1250.000
TOTAL RDTE	250.000	500.000	0.000	750.000	500.000	0.000	0.000	0.000	0.000	2000.000
PEMA										
WEAPON-I	0.000	0.000	9897.422	0.000	0.000	0.000	0.000	0.000	0.000	9897.422
MOUNT-I	0.000	0.000	5400.000	0.000	0.000	0.000	0.000	0.000	0.000	5400.000
AMMO-I	0.000	0.000	377.444	1371.302	6847.881	4980.354	303.038	0.000	0.000	13880.019
TOTAL-I	0.000	0.000	15674.866	1371.302	6847.881	4980.354	303.038	0.000	0.000	29177.441
WEAPON-S	0.000	0.000	0.000	0.000	0.000	9481.290	10611.059	0.000	0.000	20092.349
MOUNT-S	0.000	0.000	0.000	0.000	0.000	4933.500	6341.500	0.000	0.000	11275.000
AMMO-S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL-S	0.000	0.000	0.000	0.000	0.000	14414.790	16952.559	0.000	0.000	31367.349
TOTAL PEMA	0.000	0.000	15674.866	1371.302	6847.881	19395.144	17255.597	0.000	0.000	60544.790
OMA										
BP2300										
WEAPON	0.000	0.000	0.000	0.000	124.200	360.450	557.100	135.450	0.000	1177.200
MOUNT	0.000	0.000	0.000	0.000	37.812	109.737	169.606	41.237	0.000	358.392
TOTAL	0.000	0.000	0.000	0.000	162.012	470.187	726.706	176.687	0.000	1535.592
BP2100										
WEAPON	0.000	0.000	0.000	0.000	102.600	148.950	135.450	0.000	0.000	387.000
MOUNT	0.000	0.000	0.000	0.000	31.236	45.347	41.237	0.000	0.000	117.820
TOTAL	0.000	0.000	0.000	0.000	133.836	194.297	176.687	0.000	0.000	504.820
BP2200										
WEAPON/MT.	3.000	3.000	40.369	23.544	18.862	16.164	13.525	0.402	0.000	118.866
AMMO	0.000	0.000	0.000	0.747	10.457	14.271	14.940	1.775	0.000	42.190
TOTAL	3.000	3.000	40.369	24.291	29.319	30.435	28.465	2.177	0.000	161.056
BP2300										
WEAPON/MT.	1.500	3.000	21.000	21.000	12.000	12.000	10.000	0.000	0.000	80.500
AMMO	1.980	1.980	1.980	1.980	5.095	7.900	10.072	10.072	1.980	43.039
TOTAL	3.480	4.980	22.980	22.980	17.095	19.900	20.072	10.072	1.980	123.539
TOTAL OMA	6.480	7.980	63.349	47.271	342.262	714.819	951.930	188.936	1.980	2325.006
MPA	0.000	0.000	0.000	0.000	37.296	83.768	113.886	22.274	0.000	257.224
GRAND TOTALS	256.480	507.980	15738.215	2168.573	7227.439	20193.731	18321.413	211.210	1.980	65127.020

CASE 2 SECONDARY ARMAMENT STUDY INPUT DATA COSTS IN DOLLARS

ITEM/FY	68	69	70	71	72	73	74	75	76
RDWI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RDWS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RDMI	250000.000	500000.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RDMS	0.000	0.000	0.000	750000.000	500000.000	0.000	0.000	0.000	0.000
RDAI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RDAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PBSWI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PBSWS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PBSAI	0.000	0.000	250000.000	350000.000	0.000	0.000	0.000	0.000	0.000
PBSAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
GUNIU	4580.000	4580.000	4580.000	4580.000	4580.000	4580.000	4580.000	4580.000	4580.000
GUNSU	0.000	0.000	0.000	0.000	0.000	10560.000	9193.000	0.000	0.000
MTIU	2500.000	2500.000	2500.000	2500.000	2500.000	2500.000	2500.000	2500.000	2500.000
MTSU	5500.000	5500.000	5500.000	5500.000	5500.000	5500.000	5500.000	5500.000	5500.000
F11	2.140	2.140	2.140	2.140	2.140	2.140	2.140	2.140	2.140
F15	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000
F7	450.000	450.000	450.000	450.000	450.000	450.000	450.000	450.000	450.000
F8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
F9	137.000	137.000	137.000	137.000	137.000	137.000	137.000	137.000	137.000
F10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BP22W	3000.000	3000.000	40369.000	23544.000	18862.000	16164.000	13525.000	402.000	0.000
BP23WOTH	1500.000	3000.000	21000.000	21000.000	12000.000	12000.000	10000.000	0.000	0.000
F12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
F13	74.000	74.000	74.000	74.000	74.000	74.000	74.000	74.000	74.000
BALUP	0.555	0.555	0.555	0.555	0.555	0.555	0.555	0.555	0.555
TRAUP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BLAUP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
APUP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PENUP	0.000	0.000	0.000	0.000	2.000	1.500	1.250	1.250	1.250
BALUW	0.555	0.555	0.555	0.555	0.555	0.555	0.555	0.555	0.555
TRAUW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BLAUW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
APUW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PENUW	0.000	0.000	0.000	0.000	2.000	1.500	1.250	1.250	1.250
BP22AOTH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BP23AOTH	1980.000	1980.000	1980.000	1980.000	1980.000	1980.000	1980.000	1980.000	1980.000
FRBAL	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
FRTRA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FRBLA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FRAP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FRPEN	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
FSTBAL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FSTTRA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FSTBLA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FSTAP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FSTPEN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FSHBAL	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
FSHTRA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FSHBLA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FSHAP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FSHPEN	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
FMBAL	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
FMTRA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FMBLA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FMAP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FMPEN	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

SECTION IV

TANK LIFE CYCLE COST MODEL
(FOR TATAWS II STUDY)

Cost Model for Combat Vehicles:

a. (U) The following automated cost model for combat vehicles was developed by Headquarters, U. S. Army Weapons Command specifically for this phase of the TATAWS Study and was used to compute costs for the five classes of vehicles cited in paragraph a of Section I above. The model consists of a series of 22 cost equations presented, with nomenclature, in paragraphs b and c below. These equations utilize 45 items of information, or basic data, to calculate all RDT&E, PEMA, O&M,A, MPA and MCA costs for a given year. These 45 items are listed and defined under paragraph d below. The package of backup data, which is submitted as a supplement to this report, contains the numerical values by fiscal year (FY 68-79) for each of the 45 input data items for each of the 64 combinations of combat vehicle type and preferred weapon system mix in the form of computer printouts. Correspondingly, the supplementary backup data include, also, 64 computer output listings of essential costs (incurred yearly) for each of the 64 cases by fiscal year (68-79).

b. (U) Equations:

TANK1C = (TANK1P) (TANK1U) (1)

TANK2C = (TANK2P) (TANK2U) (2)

TRAIN1C = (TRAIN1P) (TRAIN1U) (3)

TRAIN2C = (TRAIN2P) (TRAIN2U) (4)

SRP = SPPI + SRPR (5)

SRPR = (DINUSE) (F1) (6)

FDT = (TANK1D + TANK2D) F2 + (TRAIN1D + TRAIN2D) F3 + (SRP/F4) F5 (7)

PEMA = TANK1C + TANK2C + TRAIN1C + TRAIN2C + PBS + SRP + FDT (8)

BP2000 = (TOECON) (F6) (F7) + (TOEOVS) (F6) (F8) (9)

BP2100 = BP21TANK + BP210TH (10)

BP21TANK = (TACON) (F6) (F7) + (TAEUR) (F6) (F8) (11)

BP210TH = BP210THC + BP210THE (12)

$$BP210THE = \frac{(TAEUR)}{(TACON)} (BP210THC) \quad (13)$$

BP2200 = SDT + BP220TH (14)

SDT = (TANK1D + TANK 2D) F9 + (REBILD) (F11) (15)

BP2300 = BP23REB + BP230TH = (TOECON + TACON) (F7) (F15) + (TOEOVS + TAEUR) (F8) (F15) (16)

BP23REB = (REBILD) (F10) (17)

OMA = BP2000 + BP2100 + BP2200 + BP2300 (18)

MPA = MPATANK + MPAOTH (19)

MPATANK = (TOECON) (F12) + (TOEOVS) (F13) (20)

MPAOTH = MPAOTHC + MPAOTHE (21)

$$MPAOTHE = \frac{(TAEUR)}{(TACON)} (MPAOTHC) \quad (22)$$

c. (U) Nomenclature:

TANK1C) TANK2C) TRAIN1C) TRAIN2C)	Yearly tank and trainer production costs
SRP	Total yearly "Selected Repair Parts" costs
SRPR	"Selected Repair Parts Costs" for replenishment per tank year
SRPI	Total yearly Selected Repair Parts Costs for Initial Provisioning
FDT	Total yearly costs for First Destination Transportation
PEMA	Total yearly PEMA programmed costs
BP2000	Total yearly BP2000 (Operating Forces) costs i.e., POL and ASF Parts)
BP2100	Total yearly BP2100 (Training) costs
BP2000	Total yearly BP2200 (Central Supply) costs
BP2300	Total yearly BP2300 (Depot Maintenance) costs
OMA	Total yearly O&M,A costs
BP21TANK	Total yearly costs for ASF parts and POL for all TA tanks
BP210TH	Total yearly operation and maintenance costs of schools and training centers in CONUS and overseas (Europe)
BP210THC	Same as BP210TH but only for CONUS
BP210THE	Same as BP210TH but only for Europe
SDT	Total yearly second destination transportation costs
BP220TH	Total yearly BP2200 costs exclusive of SDT (Procurement and Supply Activities)
BP23REB	Total yearly tank rebuild costs
BP230TH	Total yearly BP2300 costs exclusive of tank rebuild costs (Maintenance Support Activities)
MPA	Total yearly Military Personnel costs
MPATANK	Total yearly tank crew costs
MPAOTH	Total yearly military cadre and trainee costs for schools and training centers in CONUS and Europe
MPAOTHC	Same as for MPAOTH but only for CONUS
MPAOTHE	Same as for MPAOTH but only for Europe
MCA	Total yearly Military Construction Costs for CONARC

d. (U) Input Data (Yearly, FY 68 - FY 79) - 45 Items:

RDTE	Programmed RDT&E Funds
TANK1U	Yearly Average Unit Cost for Tank No. 1 Production
TANK1P	Production Quantity of No. 1 Tanks Programmed Yearly
TANK1D	Delivery Schedule for Tank No. 1
TANK1A	Tank No. 1 Assets at End of Each Year
TANK2U) TANK2P) TANK2D) TANK2A)	Refers to Tank No. 2 as above refers to Tank No. 1
TRAIN1U) TRAIN1P) TRAIN1D) TRAIN1A)) TRAIN2U) TRAIN2P) TRAIN2D) TRAIN2A)	Refer, as above, to Tank Trainers No. 1 & No. 2, respectively
PBS	Programmed Costs for Production Base Support
SRPI	Programmed Costs for Selected Rapair Parts for Initial Provisioning
DINUSE	In-use Density of Tanks (Total of Tanks 1 & 2)
TOECONUS	TOE Tanks in CONUS
TOEOVS	TOE Tanks Overseas
TACON	TA Tanks in CONUS
TAEUR	TA Tanks Overseas
REBILD	Rebild Schedule
BP210THC	Costs for Operation and Maintenance of CONARC Training Centers and Schools (exclusive of operation and maintenance of TA Tanks)
BP220TH	BP2200 Costs (Procurement and Supply Support Activities) (exclusive of second destination transportation costs)
BP230TH	BP2300 Costs (Depot Maintenance and Maintenance Support) (exclusive of tank rebuild costs)
MPAOTHC	Military Cadre and Trainee Costs for CONARC Schools and Training Centers (corresponding to BP210THC)
MCA	Military Construction Costs for CONARC

F1	Cost of (SRPR) "Selected Rapair Parts for Replenishment" per tank year
F2	Average first destination transportation costs per tank
F3	Average first destination transportation costs per trainer
F4	Average cost of an engine/transmission set
F5	Average first destination transportation cost for an engine/ transmission set
F6	Average cost of ASF parts and POL per tank mile
F7	Average miles/tank year for CONUS
F8	Average miles/tank year for overseas
F9	Average second destination transportation costs for tanks delivered overseas
F10	Average rebuild cost for tanks
F11	Average second destination transportation costs for tanks to and from rebuild depot
F12	Average yearly 4-man crew cost in CONUS
F13	Average yearly 4-man crew cost overseas
F14	Fraction of tanks delivered each year (TANK1D + TANK2D) which are shipped overseas
F15	Average cost of engine and transmission rebuild per tank mile

e. (U) All computed costs are based upon AAO's and U. S. Army world-wide combat vehicle yearly densities (FY 68 - 79) computed for each combination of vehicle type and mix. These vehicle densities, in turn, were based upon the various small unit weapon systems mixes submitted by the U. S. A. Combat Development Command after analysis of their computer combat simulation results.

f. (U) The above cost model uses the various hardware schedules (such as procurement, production, and rebuild) as well as the various vehicle density schedules (such as TOE and TA vehicles in use by area) together with other factors and input data listed in paragraph d above to compute yearly costs according to the twenty-two equations. The model is self-explanatory regarding the interrelationships among the various factors and schedules. The next section (i.e., Section III) is concerned with the details of the cost rationale and explanations of cost factors and cost estimating relationships used for estimating life cycle costs for all vehicles exclusive of the MBT-70. Explanations pertaining to the MBT-70 will be presented in Section IV.

SECTION V

IMPROVED LIFE CYCLE COST MODEL FOR SMALL ARMS WEAPON SYSTEMS

(FOR SAWS STUDY)

1. **Equations**

$$(Cnw)_j = Can(Wp)_j + .6\ Cmn \sum_{i=1}^{j} (Wp)_i + Cd \text{ (only for j=1)} \quad \ldots\ldots(1)$$

$$(Cow)_k = .6\ Cmo \left[Wpo - \sum_{i=1}^{k} Wp_{(i-1)}\right] \quad \text{for } \sum_{i=1}^{j} (Wp)_i \leq Wpo \quad \ldots\ldots(2a)$$

$$(Cow)_k = 0 \ldots\ldots \text{ for } \sum_{i=1}^{k} Wp_{(i-1)} > Wpo \quad \ldots\ldots(2b)$$

$$(Cna)_j = .8 \left[(Awn)(Wp)_j + Apn \sum_{i=1}^{j} (Wp)_i\right] + C_f \text{ (only for j=1)} \quad \ldots\ldots(3)$$

$$(Coa)_k = .8\ Apo\left[Wpo - \sum_{i=1}^{k} Wp_{(i-1)}\right] - \quad \ldots\ldots(4)$$

2. Explanation and Nomenclature

$(Cnw)_j$ = Total Cost for new weapons during the j th year.

Can = Cost to acquire a new weapon.

$(Wp)_j$ = Quantity of new weapons produced and added to Army inventory during the j th year.

Cmn = Cost to maintain a new weapon in the field for one year.

$(Wp)_i$ = Quantity of new weapons produced and added to the Army inventory during the i th year.

Note:

i-pertains to the year number, having started with the first year under consideration as year 1, and numbering the following year consecutively.

j or k-pertain to the particular year for which costs are being calculated with the equations (1) - (4).

$(Cow)_k$ = Total costs for old (existing) weapons during the k th year.

Cmo = Cost to maintain an old weapon for one year.

Wpo = Quantity of old weapons in Army inventory just before phase out is initiated.

$(Cna)_j$ = Total cost for new ammunition during the j th year. (i.e. Cost of ammunition for the new weapons).

Awn and Apn = Cost rate of ammunition usage for new weapons in $/half wpn-yr for wartime and $/wpn yr respectively.

$(Coa)_k$ = Total cost for old ammunition during the k th year (i.e. Cost of ammunition for existing weapons).

Apo = Cost rate of ammunition usage for the old (existing) weapons during peacetime training in $/wpn-yr.

Cd and Cf = Respectively, new weapon and new ammunition miscellaneous initial investment costs such as development and plant facilities costs which are not included in other weapon or ammunition cost factors.

3. Sensitivity Analysis

It is desired to determine the effects on total costs for new weapons (TCnw) and total costs for new ammunition (TCna) when each of the four weapon and ammunition costs parameters are varied by a given percentage (P). This is to be accomplished by partial differentiation of the equations relating the total costs to their cost parameters. If Wpn is the total number of new weapons and $\sum_{j=1}^{y} \sum_{i=1}^{i} Wp_i$ represents the total number of weapon years under consideration for the new weapon, the total cost equations are as follows:

$$TCnw = Can\ Wpn + .6\ Cmn \sum_{j=1}^{y} \sum_{i=1}^{j} Wp_i \quad \text{.....(5)}$$

$$TCna = .8\ Awn\ Wpn + .8\ Apn \sum_{j=1}^{y} \sum_{i=1}^{j} Wp_i \quad \text{.....(6)}$$

If the normal (original) values are represented by primed letters, the desired equations relating variation in total cost to a given percentage variation (P) in each of the four cost parameters are as follows:

$$\frac{TCnw - TC'nw}{TC'nw} = \frac{C'an}{TC'nw} P\ Wpn \quad \text{.....(7)}$$

(where P is the % variation in C'an)

$$\frac{TCnw - TC'nw}{TC'nw} = \frac{C'mn}{TC'nw} P\ (0.6)(TWY)_n \quad \text{.....(8)}$$

(where P is the % variation in C'mn)

$$\frac{TCna - TC'na}{TC'na} = \frac{A'wn}{TC'ma} P\ (0.8)\ Wpn \quad \text{.....(9)}$$

(where P is the % variation in A'wn)

$$\frac{TCna - TC'na}{TC'na} = \left[\frac{A'pn}{TC'na}\right] P\ (0.8)(TWY)_n \quad \text{.....(10)}$$

(where P is the % variation in A'pn)

The sensitivity analysis figures on the computer printouts shown in Annex D assume

P = .01 = 1%

4. COMPUTER PROGRAM

COMPUTER PROGRAM DESCRIPTION

The data read into the computer program is nested in so that the analysis proceeds in the following order: An old weapon system is described. A new weapons system is described and its unit cost-quantity relationship is read in. Production schedules are specified.

This appears logically as:

Describe old weapon system #1 (2 cards)
  Describe new system #1 (2 cards)
  Describe cost-quantity relations (2 or 3 cards)
    Describe production schedule #1 (1 card)
    Describe production schedule #2 (1 card)
    ...
    Describe production schedule #NPRØD (1 card)
  Describe new system #2 (2 cards)
  Describe cost-quantity relation (2 or 3 cards)
    Describe production schedule #1 (1 card)
    (etc.)

The indentation shows the level of nesting. The actual description of the systems and data follows a fairly rigid format on punched cards. To describe the old weapon system one needs two cards. The first contains an alpha-numeric description, up to 80 characters in length, of the users' choosing. This will be printed on each output file. The second card contains WPØ, the number of old weapons; CMØ, the cost to maintain an old weapon per year; APØ, the cost of ammo per year of peacetime per old weapon; SYS, the number of second-level nests until the next first-level nest (i.e.,

the number of new weapon systems to be considered with the old one just described); QØ, QM, DQ, initial, final and increment quantities of weapons to be used to construct a total cost-quantity table for the systems. The FØRTRAN format is 8F10.0 which means that each number has a 10-column field and may appear anywhere within the field as long as it has its decimal point punched.

To describe the new weapon systems, the following cards are required for each: The first card contains an alpha-numeric description of up to 80 characters of the users' choosing. The second card contains CD, the cost of development; CURVE, the number of points on the cost-quantity relation (usually 3 for rifles and 2 for machine guns); PRØDS, the number of different production schedules to be considered; and FYEAR, the actual number of the year which will be used to start the 14 year costing (if 1970 were given, the program would cost from 1970 thru 1983). Again, the format is 8F10.0 with the decimals punched with the data. The next cards (CURVE of them) will each contain one point from the unit cost-quantity relation. The numbers on the card are WPL, the quantity; CAL, the unit-cost-to-acquire a weapon for the quantity WPL; CML, the unit-cost-to-maintain a weapon for the quantity WPL for a year; APL, the unit-cost-of-ammo per year of peacetime per weapon for the quantity WPL; AWL, the unit-cost-of-ammo per half year of wartime per weapon for the quantity WPL and CFL, the unit-cost-to-field a weapon for the quantity WPL. The format is 8F10.0. The quantities are ordered in increasing WPL.

The production schedules are entered next. If there are PRØDS schedules there will be PRØDS cards punched next. There may be as many as 8 quantities

entered. The first corresponds to production in the first year (FYEAR), the second corresponds to production in the second year (FYEAR + 1) and so on up to a maximum of 8 years. (Usually four or five are all that are needed.) The format is 8F10.0.

This completes level 3 nesting. The next cards would beginning either a new second level or a first level.

Note that new weapon systems are costed starting with the year given by FYEAR. The old weapon system is always costed starting in 1967. This is set in the program, near the beginning, by the statement IFY=1967. Both systems must be costed for the same period of time, in our study, 14 years. That is why variables referring to old-system quantities are subscripted with j and new-system quantities are subscripted with k . The computer program increments calendar years starting with IFY=1967 by one thru FYEAR + 14. Therefore, for some given calendar year, j and k may not necessarily take on the same values because they may be in different parts of their respective 14-year spans. After the 14-year span for old weapon systems is complete, the old-system costs are no longer computed. Also during the calendar years from IFY to FYEAR the new weapon systems are not costed. This is how the two 14-year costing periods are superimposed in the printouts.

The FØRTRAN function DDM is a routine for performing linear interpolation of costs as a function of quantity in the cost-quantity relations. A more sophisticated quadratic interpolation is also available but cannot be used if there are only two or three points in the curve.

Since the program was written in FØRTRAN-II language and successfully run on the most restrictive compiler in our experience, the RCA-301 FØRTRAN system, no difficulty should be expected in implementing the program on other systems. Copies of the source program are available upon request from the authors. (The program itself is not classified.)

```
C      S.A.W.S. AUTOMATED COST METHODOLOGY-II A.W.C.-O.R.  8 JUNE 1966
       DIMENSION OLD(16),DNEW(16),WP(25),TCNW(25),TCOW(25),TCNA(25),
      1 TCOA(25),WPNT(25),WPL(10),CAL(10),CML(10),APL(10),AWL(10),
      2 CFL(10),C(10,25),CMR(10)
       IFY=1967
       PCNT=1.
       IY=14
       JY=IFY-1
00023  READ 1,OLD,WPO,CMO,APO,SYS,QO,QM,DO
00001  FORMAT (16A5/8F10.0)
       NSYS=SYS
       DO 2 ISYS=1,NSYS
       READ 1,DNEW,CD,CURVE,PRODS,FYEAR
       NL=CURVE
       NPROD=PRODS
       NYPR=FYEAR
       READ 3,(WPL(I),CAL(I),CML(I),APL(I),AWL(I),CFL(I),I=1,NL)
00003  FORMAT (6F10.0)
       IYPR=NYPR-IFY
       JEND=NYPR-IFY+IY
       DO 24 IP=1,NPROD
       PRINT 5,OLD,WPO,CMO,APO,CD,DNEW
00005  FORMAT (1H1/16A5/1H0/6X9HWPO,UNITS5X10HCMO,$/UNIT2X13HAPO,$/UNIT/YR
      1 11X4HCD,$/1H0F15.0,3F15.2//1H0/16A5)
       DO 6 I=1,25
00006  WP(I)=0.
       IL=IYPR+1
       IW=IYPR+8
```

```
      READ 7,(WP(I),I=IL,IH)
00007 FORMAT (8F10.0)
      WPN=0.
      DO 8 I=1,25
00008 WPN=WPN+WP(I)
      CAN=DDM(WPL,CAL,WPN,NL)
      CMN=DDM(WPL,CML,WPN,NL)
      APN=DDM(WPL,APL,WPN,NL)
      AWN=DDM(WPL,AWL,WPN,NL)
      CFN=DDM(WPL,CFL,WPN,NL)
      WPNT(IP)=WPN
      GT=0.
      TCNW(IP)=0.
      TCOW(IP)=0.
      TCNA(IP)=0.
      TCOA(IP)=0.
      DSN=0.
      DSO=0.
      WPN=0.
      DO 9 J=1,JEND
      WPN=WPN+WP(J)
      DO 10 I=1,J
00010 DSN=DSN+WP(I)
      PS=WPO
      IF (J-1)11,11,12
00012 IF (J-IY)13,13,14
00013 DO 15 I=2,J
      PART=PS-WP(I-1)
```

```
      IF (PART)25,15,15
00025 DSO=DSO+PS
      PS=0.
      GO TO 19
00015 PS=PART
00011 DSO=DSO+PS
      GO TO 19
00014 DSO=0.
      PS=0.
00019 CNW=WP(J)*CAN+.6*WPN*CMN
      COW=.6*CMO*PS
      CNA=.8*(AWN*WP(J)+APN*WPN)
      COA=.8*APO*PS
      IF (J-TYPR-1)18,17,18
00017 CNA=CNA+CEN
      CNW=CNW+CO
00018 TCNW(IP)=TCNW(IP)+CNW
      TCOW(IP)=TCOW(IP)+COW
      TCNA(IP)=TCNA(IP)+CNA
      TCOA(IP)=TCOA(IP)+COA
      TCPY=CNA+CNW
      GT=GT+TCPY+COW+COA
      C(1,J)=CNW
      C(2,J)=TCNW(IP)
      C(3,J)=COW
      C(4,J)=TCOW(IP)
      C(5,J)=CNA
      C(6,J)=TCNA(IP)
```

```
      C(7,J)=COA
      C(8,J)=TCOA(IP)
      C(9,J)=TCPY
00009 C(10,J)=GI
      TC=TCNW(IP)+TCNA(IP)
      PNWCA=PCNT*CAN*WPN/TC
      PNWCM=PCNT*CMN*.6*DSN/TC
      PNAAW=PCNT*AWN*.8*WPN/TC
      PNAAP=PCNT*APN*.8*DSN/TC
      PRINT 16,WPN,CAN,CMN,AWN,APN,CFN,PCNT,PNWCA,PNWCM,PNAAW,PNAAP
00016 FORMAT (1H012X3HWPN12X3HCAN12X3HCMN12X3HAWN12X3HAPN13X2HCF/1H 10X
     1 5HUNITS9X6H$/UNIT9X6H$/UNIT4X11H$/UNIT/YR/26X9H$/UNIT/YR14X1H$/
     2 1H0F15.0,5F15.2//1H06X9HPARAMETER4X40H  PER CENT CHANGE IN NEW SY
     3STEM COST (ATF5.2,16H PER CENT LEVEL)/1H 12X3HCANF15.4/1H 12X3HCMN
     4 F15.4/1H 12X3HAWNF15.4/1H 12X3HAPNF15.4)
      PRINT 28
00028 FORMAT                                        (1H010X56HCOSTS PER YEAR B
     1ASED ON PRODUCTION SCHEDULE IN MEGABUCKS/              1H02X2HFY2X
     2 2HNO7X3HWPI7X3HCNW3X/HCUM CNW7X3HCOW3X/HCUM COW7X3HCNA3X7HCUM CNA
     3 7X3HCOA3X/HCUM COA3X7HNEW SYS5X5HTOTAL)
      DO 27 J=1,JEND
      KJ=JY+J
      DO 29 I=1,10
00029 CMB(I)=C(I,J)*1.E-6
00027 PRINT 30,KJ,J,WP(J),CMB
00030 FORMAT (1H0214,F10.0,10F10.4)
00024 CONTINUE
      NQ=(QM-QO)/DQ+1.5
```

```
      IF (NQ)2,2,20
00020 PRINT 21,DNEW
00021 FORMAT (1H1116A5/61H0COST-QUANTITY CALCULATIONS (BASED ON PREVIOUS
     1COSTS PRINTED)/1H012X3HWPN11X4HTCNW11X4HTCOW11X4HTCNA11X4HTCOA8X
     2 7HTOT SYS/1H 10X5HUNITS5(6X9HMEGABUCKS))
      Q=QQ
      DO 4 I=1,NQ
      CNW=DDM(WPNT,TCNW,Q,NPROD)*1.E-6
      COW=DDM(WPNT,TCOW,Q,NPROD)*1.E-6
      CNA=DDM(WPNT,TCNA,Q,NPROD)*1.E-6
      COA=DDM(WPNT,TCOA,Q,NPROD)*1.E-6
      TC=CNW+COW+CNA+COA
      PRINT 22,Q,CNW,COW,CNA,COA,TC
00022 FORMAT (1H F15.0,5F15.3)
00004 Q=Q+DQ
00002 CONTINUE
      GO TO 23
      END
C     SEPARATION CARD BETWEEN PROGRAMS FOR FORTRAN COMPATABILITY
      FUNCTION DDM(XT,YT,X,N)
      DIMENSION XT(100),YT(100)
      IF (N-1)1,1,2
00001 DDM=YT(1)
      RETURN
00002 DO 3 I=2,N
      IF (X-XT(I))4,4,3
00003 CONTINUE
      I=N
```

```
00004 DDM=YT(I-1)+(YT(I)-YT(I-1))*(X-XT(I-1))/(XT(I)-XT(I-1))
      IF (DDM)5,6,6
00005 DDM=0.
00006 RETURN
      END
*DATA
```

NOMENCLATURE FOR COMPUTER PRINT-OUTS

The nomenclature for these Annex D computer print-outs is the same as given in Appendix I of Annex E except for the following:

CF	= Same as CFN in Annex E
WPI	= New weapon production quantities (These are listed one year before their production, in each instance)
CNW	= Yearly Costs for new weapons
CUM	= Cumulative Costs
CNA	= Yearly costs for ammo for new weapons
COW	= Yearly costs for old (existing) weapons
COA	= Yearly costs for ammo for old weapons
NEW SYS	= CNW + CNA
TOTAL	= Cumulative totals = (CUM CNW) + (CUM CNA) + (CUM COW) + (CUM COA)

OLD WEAPON M1/M14 RIFLES

WPO.UNITS	CMO.$/UNIT	APO.$/UNIT/YR	
	13.00	55.00	230500.00

RIFLE REPLACES M1/M14 CASE 1(A)

WPN UNITS	CAN $/UNIT	CMN $/UNIT	AMN $/UNIT/YR/2	APN $/UNIT/YR	CF $
100000.	153.22	14.21	170.59	64.40	.00

PARAMETER	PER CENT CHANGE IN NEW SYSTEM COST (AT 1.00 PER CENT LEVEL)
CAN	.1395
CMN	.1043
AMN	.1242
APN	.6299

COSTS PER YEAR BASED ON PRODUCTION SCHEDULE IN MEGABUCKS

FY	NO	WPI	CNW	CUM CNW	COW	CUM COW	CNA	CUM CNA	COA	CUM COA	NEW SYS	TOTAL
1967	1	.	.0000	.0000	11.9997	11.9997	.0000	.0000	67.6908	67.6908	.0000	79.6905
1968	2	42938.	7.1756	7.1756	11.9997	23.9995	8.0718	8.0718	67.6908	135.3816	15.2475	174.6285
1969	3	57062.	9.5959	16.7715	11.6648	35.6643	12.9391	21.0110	65.8015	201.1831	22.5350	274.6299
1970	4	.	.8529	17.6244	11.2197	46.8840	5.1520	26.1630	63.2908	264.4739	6.0049	355.1452
1971	5	.	.8529	18.4772	11.2197	58.1037	5.1520	31.3150	63.2908	327.7647	6.0049	435.6606
1972	6	.	.8529	19.3301	11.2197	69.3235	5.1520	36.4670	63.2908	391.0555	6.0049	516.1760
1973	7	.	.8529	20.1829	11.2197	80.5432	5.1520	41.6190	63.2908	454.3463	6.0049	596.6914
1974	8	.	.8529	21.0358	11.2197	91.7629	5.1520	46.7710	63.2908	517.6370	6.0049	677.2067
1975	9	.	.8529	21.8886	11.2197	102.9827	5.1520	51.9230	63.2908	580.9278	6.0049	757.7221
1976	10	.	.8529	22.7415	11.2197	114.2024	5.1520	57.0750	63.2908	644.2186	6.0049	838.2375
1977	11	.	.8529	23.5943	11.2197	125.4221	5.1520	62.2270	63.2908	707.5094	6.0049	918.7528
1978	12	.	.8529	24.4472	11.2197	136.6419	5.1520	67.3790	63.2908	770.8002	6.0049	999.2682
1979	13	.	.8529	25.3000	11.2197	147.8616	5.1520	72.5310	63.2908	834.0910	6.0049	1079.7835
1980	14	.	.8529	26.1529	11.2197	159.0813	5.1520	77.6830	63.2908	897.3818	6.0049	1160.2989
1981	15	.	.8529	27.0057	.0000	159.0813	5.1520	82.8350	.0000	897.3818	6.0049	1166.3038

OLD WEAPON M1/M14 RIFLES

WPN.UNITS	CMN.$/UNIT	APN.$/UNIT/YR	CD.$
	13.00	55.00	230500.00

RIFLE REPLACES M1/M14 CASE 1(A)

WPN UNITS	CAN $/UNIT	CMN $/UNIT	AMN $/UNIT/YR/2	APN $/UNIT/YR	CF $
	150.18	14.00	159.73	64.40	.00

PARAMETER	PER CENT CHANGE IN NEW SYSTEM COST (AT 1.00 PER CENT LEVEL)
CAN	.1422
CMN	.1031
AMN	.1210
APN	.6323

COSTS PER YEAR BASED ON PRODUCTION SCHEDULE IN MEGABUCKS

FY	NO	WPI	CNM	CUM CNM	COM	CUM COM	CNA	CUM CNA	COA	CUM COA	NEW SYS	TOTAL
1967	1	.	.0000	.0000	11.9997	11.9997	.0000	.0000	67.6908	67.6908	.0000	79.6905
1968	2	42938.	7.0396	7.0396	11.9997	23.9995	7.6990	7.6990	67.6908	135.3816	14.7386	174.1196
1969	3	75000.	12.2542	19.2938	11.6648	35.6643	15.6600	23.3589	65.8015	201.1831	27.9141	279.5001
1970	4	49838.	8.8940	28.1878	11.0798	46.7441	15.0123	38.3712	62.5015	263.6846	23.9063	376.9877
1971	5	.	1.4093	29.5971	10.6911	57.4352	8.6438	47.0151	60.3086	323.9933	10.0531	458.0406
1972	6	.	1.4093	31.0064	10.6911	68.1262	8.6438	55.6589	60.3086	384.3019	10.0531	539.0934
1973	7	.	1.4093	32.4157	10.6911	78.8173	8.6438	64.3027	60.3086	444.6105	10.0531	620.1463
1974	8	.	1.4093	33.8250	10.6911	89.5084	8.6438	72.9465	60.3086	504.9192	10.0531	701.1992
1975	9	.	1.4093	35.2344	10.6911	100.1995	8.6438	81.5903	60.3086	565.2278	10.0531	782.2520
1976	10	.	1.4093	36.6437	10.6911	110.8906	8.6438	90.2342	60.3086	625.5365	10.0531	863.3049
1977	11	.	1.4093	38.0530	10.6911	121.5816	8.6438	98.8780	60.3086	685.8451	10.0531	944.3577
1978	12	.	1.4093	39.4623	10.6911	132.2727	8.6438	107.5218	60.3086	746.1537	10.0531	1025.4106
1979	13	.	1.4093	40.8716	10.6911	142.9638	8.6438	116.1656	60.3086	806.4624	10.0531	1106.4634
1980	14	.	1.4093	42.2810	10.6911	153.6549	8.6438	124.8094	60.3086	866.7710	10.0531	1187.5162
1981	15	.	1.4093	43.6903	.0000	153.6549	8.6438	133.4533	.0000	866.7710	10.0531	1197.5693

OLD WEAPON M1/M14 RIFLES

WPO.UNITS	CMO.$/UNIT	APO.$/UNIT/YR	CO.$
	13.00	55.00	230500.00

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RIFLE REPLACES M1/M14 CASE 1(A)

WPN UNITS	CAN $/UNIT	CMN $/UNIT	AWN $/UNIT/YR/2	APN $/UNIT/YR	CF $
200000.	148.73	13.90	154.57	64.40	.00

PARAMETER — PER CENT CHANGE IN NEW SYSTEM COST (AT 1.00 PER CENT LEVEL)

CAN	.1430
CMN	.1027
AWN	.1189
APN	.6343

COSTS PER YEAR BASED ON PRODUCTION SCHEDULE IN MEGABUCKS

FY	NO	WPI	CNW	CUM CNW	COW	CUM COW	CNA	CUM CNA	COA	CUM COA	NEW SYS	TOTAL
1967	1	.	.0000	.0000	11.9997	11.9997	.0000	.0000	67.6908	67.6908	.0000	79.6905
1968	2	42938.	6.9749	6.9749	11.9997	23.9995	7.5217	7.5217	67.6908	135.3816	14.4966	173.8776
1969	3	75000.	12.1386	19.1135	11.6648	35.6643	15.3503	22.8720	65.8015	201.1831	27.4889	278.8328
1970	4	82062.	13.8753	32.9888	11.0798	46.7441	20.4514	43.3234	62.5015	263.6846	34.3246	386.7388
1971	5	.	1.6678	34.6565	10.4397	57.1838	10.3040	53.6274	58.8908	322.5754	11.9718	468.0411
1972	6	.	1.6678	36.3225	10.4397	67.6236	10.3040	63.9314	58.8908	381.4662	11.9718	549.3434
1973	7	.	1.6678	37.9901	10.4397	78.0633	10.3040	74.2354	58.8908	440.3570	11.9718	630.6457
1974	8	.	1.6678	39.6579	10.4397	88.5030	10.3040	84.5394	58.8908	499.2478	11.9718	711.9480
1975	9	.	1.6678	41.3257	10.4397	98.9427	10.3040	94.8434	58.8908	558.1386	11.9718	793.2503
1976	10	.	1.6678	42.9934	10.4397	109.3825	10.3040	105.1474	58.8908	617.0294	11.9718	874.5526
1977	11	.	1.6678	44.6612	10.4397	119.8222	10.3040	115.4514	58.8908	675.9201	11.9718	955.8549
1978	12	.	1.6678	46.3290	10.4397	130.2619	10.3040	125.7554	58.8908	734.8109	11.9718	1037.1572
1979	13	.	1.6678	47.9968	10.4397	140.7017	10.3040	136.0594	58.8908	793.7017	11.9718	1118.4595
1980	14	.	1.6678	49.6646	10.4397	151.1414	10.3040	146.3634	58.8908	852.5925	11.9718	1199.7618
1981	15	.	1.6678	51.3323	.0000	151.1414	10.3040	156.6674	.0000	852.5925	11.9718	1211.7336

OLD WEAPON M1/M14 RIFLES

WPO.UNITS	CMO.$/UNIT	APO.$/UNIT/YR	CO.$
	13.00	55.00	230500.00

63 RIFLE REPLACES M1/M14 CASE 1(A)

WPN UNITS	CAN $/UNIT	CMN $/UNIT	AWN $/UNIT/YR/2	APN $/UNIT/YR	CF $
400000.	139.76	13.27	122.54	64.40	.00

PARAMETER	PER CENT CHANGE IN NEW SYSTEM COST (AT 1.00 PER CENT LEVEL)
CAN	.1401
CMN	.1019
AWN	.0982
APN	.6593

COSTS PER YEAR BASED ON PRODUCTION SCHEDULE IN MEGABUCKS

FY	NO	WPI	CNW	CUM CNW	COW	CUM COW	CNA	CUM CNA	COA	CUM COA	NEW SYS	TOTAL
1967	1	.	.0000	.0000	11.9997	11.9997	.0000	.0000	67.6908	67.6908	.0000	79.6905
1968	2	85875.	12.9163	12.9163	11.9997	23.9995	12.8425	12.8425	67.6908	135.3816	25.7589	185.1399
1969	3	150000.	22.8422	35.7586	11.3299	35.3294	26.8566	39.6992	63.9123	199.2939	49.6989	310.0810
1970	4	150000.	24.0362	59.7947	10.1599	45.4893	34.5846	74.2838	57.3123	256.6062	58.6208	436.1740
1971	5	14125.	5.1580	64.9528	8.9899	54.4792	21.9927	96.2765	50.7123	307.3184	27.1507	523.0268
1972	6	.	3.1839	68.1366	8.8797	63.3589	20.6080	116.8845	50.0908	357.4092	23.7919	605.7892
1973	7	.	3.1839	71.3205	8.8797	72.2386	20.6080	137.4925	50.0908	407.5000	23.7919	688.5516
1974	8	.	3.1839	74.5043	8.8797	81.1184	20.6080	158.1005	50.0908	457.5908	23.7919	771.3140
1975	9	.	3.1839	77.6882	8.8797	89.9981	20.6080	178.7085	50.0908	507.6816	23.7919	854.0763
1976	10	.	3.1839	80.8720	8.8797	98.8778	20.6080	199.3165	50.0908	557.7724	23.7919	936.8387
1977	11	.	3.1839	84.0559	8.8797	107.7576	20.6080	219.9245	50.0908	607.8632	23.7919	1019.6010
1978	12	.	3.1839	87.2397	8.8797	116.6373	20.6080	240.5325	50.0908	657.9540	23.7919	1102.3634
1979	13	.	3.1839	90.4236	8.8797	125.5170	20.6080	261.1405	50.0908	708.0448	23.7919	1185.1258
1980	14	.	3.1839	93.6074	8.8797	134.3968	20.6080	281.7485	50.0908	758.1356	23.7919	1267.8882
1981	15	.	3.1839	96.7913	.0000	134.3968	20.6080	302.3565	.0000	758.1356	23.7919	1291.6801

OLD WEAPON M1/M14 RIFLES

APC,UNITS	CMC,$/UNIT	APC,$/UNIT/YR	CD,$
	13.00	55.00	230500.00

RIFLE REPLACES M1/M14 CASE 1(A)

WPN UNITS	CAN $/UNIT	CMN $/UNIT	AMN $/UNIT/YR/2	APN $/UNIT/YR	CF $
500000.	135.28	12.95	106.52	64.40	.00

PARAMETER	PER CENT CHANGE IN NEW SYSTEM COST (AT 1.00 PER CENT LEVEL)
CAN	.1413
CMN	.1008
AMN	.0893
APN	.6683

COSTS PER YEAR BASED ON PRODUCTION SCHEDULE IN MEGABUCKS

FY	NO	MPI	CMN	CUM CMN	COM	CUM COM	CNA	CUM CNA	COA	CUM COA	NEW SYS	TOTAL
1967	1	.	.0000	.0000	11.9997	11.9997	.0000	.0000	67.6908	67.6908	.0000	79.6905
1968	2	85875.	12.5149	12.5149	11.9997	23.9995	11.7422	11.7422	67.6908	135.3816	24.2571	183.6362
1969	3	150000.	22.1247	34.6397	11.3299	35.3294	24.9347	36.6769	63.9123	199.2939	47.0594	305.9388
1970	4	150000.	23.2902	57.9299	10.1599	45.4893	32.6627	69.3396	57.3123	256.6062	55.9529	429.3649
1971	5	114125.	19.3238	77.2537	8.9899	54.4792	35.4853	104.8248	50.7123	307.3184	54.8091	543.8762
1972	6	.	3.8850	81.1387	8.0997	62.5789	25.7600	130.5848	45.6908	353.0092	29.6450	627.3116
1973	7	.	3.8850	85.0237	8.0997	70.6786	25.7600	156.3448	45.6908	398.7000	29.6450	710.7473
1974	8	.	3.8850	88.9087	8.0997	78.7784	25.7600	182.1048	45.6908	444.3908	29.6450	794.1820
1975	9	.	3.8850	92.7937	8.0997	86.8781	25.7600	207.8648	45.6908	490.0816	29.6450	877.6183
1976	10	.	3.8850	96.6787	8.0997	94.9778	25.7600	233.6248	45.6908	535.7724	29.6450	961.0535
1977	11	.	3.8850	100.5637	8.0997	103.0776	25.7600	259.3848	45.6908	581.4632	29.6450	1044.4893
1978	12	.	3.8850	104.4487	8.0997	111.1773	25.7600	285.1448	45.6908	627.1540	29.6450	1127.9248
1979	13	.	3.8850	108.3337	8.0997	119.2770	25.7600	310.9048	45.6908	672.8448	29.6450	1211.3605
1980	14	.	3.8850	112.2187	8.0997	127.3768	25.7600	336.6648	45.6908	718.5356	29.6450	1294.7956
1981	15	.	3.8850	116.1037	.0000	127.3768	25.7600	362.4248	.0000	718.5356	29.6450	1324.4428

OLD WEAPON M1/M14 RIFLES

MPI,UNITS	CMO,$/UNIT	APO,$/UNIT/YR	CO,$
	13.00	55.00	230500.00

RIFLE REPLACES M1/M14 CASE 1(A)

MPN UNITS	CAN $/UNIT	CMN $/UNIT	AMN $/UNIT/YR/2	APN $/UNIT/YR	CF $
60000.	135.05	12.95	104.36	64.40	770395.99

PARAMETER	PER CENT CHANGE IN NEW SYSTEM COST (AT 1.00 PER CENT LEVEL)
CAN	.1443
CMN	.1002
AMN	.0892
APN	.6645

COSTS PER YEAR BASED ON PRODUCTION SCHEDULE IN MEGABUCKS

FY	NO	MPI	CNW	CUM CNW	COW	CUM COW	CNA	CUM CNA	COA	CUM COA	NEW SYS	TOTAL
1967	1	.	.0000	.0000	11.9997	11.9997	.0000	.0000	67.6908	67.6908	.0000	79.6905
1968	2	85875.	12.4953	12.4953	11.9997	23.9995	12.3639	12.3639	67.6908	135.3816	24.8593	184.2403
1969	3	150000.	22.0903	34.5856	11.3299	35.3294	24.6750	37.0390	63.9123	199.2939	46.7653	306.2478
1970	4	150000.	23.2553	57.8409	10.1599	45.4893	32.4030	69.4420	57.3123	256.6062	55.6584	429.3783
1971	5	150000.	24.4204	82.2613	8.9899	54.4792	40.1310	109.5730	50.7123	307.3184	64.5514	553.6320
1972	6	64125.	13.3206	95.5820	7.8199	62.2991	36.2655	145.8385	44.1123	351.4307	49.5861	655.1503
1973	7	.	4.6603	100.2422	7.3197	69.6188	30.9120	176.7505	41.2908	392.7215	35.5723	739.3331
1974	8	.	4.6603	104.9025	7.3197	76.9385	30.9120	207.6625	41.2908	434.0123	35.5723	823.5159
1975	9	.	4.6603	109.5628	7.3197	84.2583	30.9120	238.5745	41.2908	475.3031	35.5723	907.6986
1976	10	.	4.6603	114.2230	7.3197	91.5780	30.9120	269.4865	41.2908	516.5939	35.5723	991.8814
1977	11	.	4.6603	118.8833	7.3197	98.8977	30.9120	300.3985	41.2908	557.8847	35.5723	1076.0641
1978	12	.	4.6603	123.5436	7.3197	106.2175	30.9120	331.3105	41.2908	599.1755	35.5723	1160.2469
1979	13	.	4.6603	128.2039	7.3197	113.5372	30.9120	362.2225	41.2908	640.4663	35.5723	1244.4297
1980	14	.	4.6603	132.8641	7.3197	120.8569	30.9120	393.1345	41.2908	681.7571	35.5723	1328.6125
1981	15	.	4.6603	137.5244	.0000	120.8569	30.9120	424.0465	.0000	681.7571	35.5723	1364.1848

RIFLE REPLACES M1/M14 RIFLES

MPD,UNITS	CMD,$/UNIT	APD,$/UNIT/YR	CD,$
	13.00	55.00	230500.00

RIFLE REPLACES M1/M14 CASE 1(A)

APN UNITS	CAN $/UNIT	CMN $/UNIT	AMN $/UNIT/YR/2	APN $/UNIT/YR	CF $
300000.	154.40	12.94	100.03	64.40	2311188.00

PARAMETER	PER CENT CHANGE IN NEW SYSTEM COST (AT 1.00 PER CENT LEVEL)
CAN	.1423
CMN	.1008
AMN	.0846
APN	.6890

COSTS PER YEAR BASED ON PRODUCTION SCHEDULE IN MEGABUCKS

FY	NO	MPI	CNM	CUM CNM	COM	CUM COM	CNA	CUM CNA	COA	CUM COA	NEW SYS	TOTAL
1967	1	.	.0000	.0000	11.9997	11.9997	.0000	.0000	67.6908	67.6908	.0000	79.6905
1968	2	85875.	12.4561	12.4561	11.9997	23.9995	13.6074	13.6074	67.6908	135.3816	24.0635	185.4446
1969	3	235875.	34.2469	46.7030	11.3299	35.3294	35.4519	49.0594	63.9123	199.2939	59.6989	330.3856
1970	4	300000.	45.2068	91.9098	9.4901	44.8194	56.0394	105.0987	53.5338	252.8277	101.2462	494.6557
1971	5	178250.	30.2022	122.1121	7.1501	51.9695	55.4801	160.5788	40.3338	293.1614	85.6823	627.8218
1972	6	.	6.2091	128.3211	5.7597	57.7293	41.2160	201.7948	32.4908	325.6522	47.4251	713.4974
1973	7	.	6.2091	134.5302	5.7597	63.4890	41.2160	243.0108	32.4908	358.1430	47.4251	799.1730
1974	8	.	6.2091	140.7393	5.7597	69.2487	41.2160	284.2268	32.4908	390.6338	47.4251	884.8486
1975	9	.	6.2091	146.9484	5.7597	75.0085	41.2160	325.4428	32.4908	423.1246	47.4251	970.5242
1976	10	.	6.2091	153.1574	5.7597	80.7682	41.2160	366.6588	32.4908	455.6154	47.4251	1056.1997
1977	11	.	6.2091	159.3665	5.7597	86.5279	41.2160	407.8748	32.4908	488.1062	47.4251	1141.8753
1978	12	.	6.2091	165.5756	5.7597	92.2876	41.2160	449.0908	32.4908	520.5970	47.4251	1227.5509
1979	13	.	6.2091	171.7846	5.7597	98.0474	41.2160	490.3068	32.4908	553.0878	47.4251	1313.2265
1980	14	.	6.2091	177.9937	5.7597	103.8071	41.2160	531.5228	32.4908	585.5786	47.4251	1398.9021
1981	15		6.2091	184.2028	.0000	103.8071	41.2160	572.7388	.0000	585.5786	47.4251	1446.3272

OLD WEAPON M1/M14 RIFLES

APD,UNITS	CMD,$/UNIT	APD,$/UNIT/YR	CD,$
	13.00	55.00	250000.00

RIFLE REPLACES M1/M14 (CASE 1(A))

APN UNITS	CAN $/UNIT	CMN $/UNIT	AMN $/UNIT/YR/2	APN $/UNIT/YR	CF $
1000000.	134.15	12.93	95.70	64.40	3851980.00

PARAMETER	PER CENT CHANGE IN NEW SYSTEM COST (AT 1.00 PER CENT LEVEL)
CAN	.1455
CMN	.1004
AMN	.0429
APN	.6669

COSTS PER YEAR BASED ON PRODUCTION SCHEDULE IN MEGABUCKS

FY	NO	MPI	CNW	CUM CNW	COW	CUM COW	CNA	CUM CNA	COA	CUM COA	NEW SYS	TOTAL
1967	1	.	.0000	.0000	11.9997	11.9997	.0000	.0000	67.6908	67.6908	.0000	79.6905
1968	2	858?5.	12.4169	12.4169	11.9997	23.9995	14.8509	14.8509	67.6908	135.3816	27.2678	186.6489
1969	3	2358?5.	34.1388	46.5557	11.3299	35.3294	34.6353	49.4862	63.9123	199.2939	68.7741	330.6651
1970	4	500000.	45.0680	91.6237	9.4901	44.8194	55.0007	104.4869	53.5338	252.8277	100.0687	493.7577
1971	5	500000.	47.3947	139.0184	7.1561	51.9695	70.4567	174.9437	40.3338	293.1614	117.8514	659.0930
1972	6	78250.	18.2531	157.2714	4.8101	56.7796	57.5109	232.4545	27.1338	320.2952	75.7639	766.8008
1973	7	.	7.7556	165.0270	4.1997	60.9793	51.5200	283.9745	23.6908	343.9860	59.2756	853.9669
1974	8	.	7.7556	172.7825	4.1997	65.1791	51.5200	335.4945	23.6908	367.6768	59.2756	941.1330
1975	9	.	7.7556	180.5381	4.1997	69.3788	51.5200	387.0145	23.6908	391.3676	59.2756	1028.2990
1976	10	.	7.7556	188.2937	4.1997	73.5785	51.5200	438.5345	23.6908	415.0584	59.2756	1115.4651
1977	11	.	7.7556	196.0492	4.1997	77.7783	51.5200	490.0545	23.6908	438.7492	59.2756	1202.6312
1978	12	.	7.7556	203.8048	4.1997	81.9780	51.5200	541.5745	23.6908	462.4400	59.2756	1289.7973
1979	13	.	7.7556	211.5603	4.1997	86.1777	51.5200	593.0945	23.6908	486.1308	59.2756	1376.9634
1980	14	.	7.7556	219.3159	4.1997	90.3775	51.5200	644.6145	23.6908	509.8216	59.2756	1464.1295
1981	15	.	7.7556	227.0715	.0000	90.3775	51.5200	696.1345	.0000	509.8216	59.2756	1523.4051

SECTION VI

SIMPLIFIED LIFE CYCLE COST MODEL FOR SMALL ARMS WEAPON SYSTEMS

(FOR SAWS STUDY)

ANNEX E

Mathematical Model and Methodology for Weapon System Cost Study

1. (U) Objective. To develop a cost estimating methodology and mathematical model which will provide the means to compute total program costs and perform sensitivity analyses of the cost estimates to variations in the cost assumptions.

2. (U) Discussion. The cost data presented in the previous annexes of this study are based upon certain specific values of the various parameters involved which have been determined by calculation, or otherwise, to be the best present estimates of their true values. The most important of these parameters are weapon quantities (W), weapon acquisition and maintenance costs (C_a and C_m), unit cartridge costs (U), peacetime training ammunition allowances (P_a), wartime day-of-supply rates (D_s), worldwide weapon distributions and various time factors. This annex is concerned principally with the mathematical relationships of these parameters to total weapon system costs (paragraph 3) and with the capability by virtue of such relationships to vary each of these parameters as desired. Such a mathematical model permits not only a relatively [illegible] cross accuracy and consistency check on all total system costs [illegible]nted in the previous annexes but permits also a simple and rapid means of calculating new total costs if it is desired to determine such

costs for parameter values which vary from those used in the main study. These are illustrated in paragraph 4 and 5 of this annex.

As illustrated also in paragraph 5, the mathematical model permits an analysis of the sensitivity of total costs to variations in the cost parameters as well as an assessment of the significance of the differences in total costs for various weapon systems as presented in this study.

3 Equations and Nomenclature:

For New Weapons: $$TC = W_p C_a + .60\, W_p C_m \left(Y_{at} + \frac{Y_t}{2}\right) + C_d \quad (1)$$

For Old Weapons: ($W_{pn} < W_{po}$) $$TC = .60\, W_{po} C_m \left[Y_{bt} + Y_t \left(1 - \frac{W_{pn}}{2W_{po}}\right) + Y_{at} \left(1 - \frac{W_{pn}}{W_{po}}\right) \right] \quad (2)$$

For Old Weapons: (Comp Phase-Out, $W_{pn} \geq W_{po}$) $$TC = .60\, W_p C_m \left(1 + Y_{bt} + -\frac{Y_t}{2}\right) \quad (3)$$

Ammo For New Wpn: $$TC = \frac{W_f Y_t A_p}{2} + Y_{at} W_f A_p + W_f A_w + C_f \quad (4)$$

Ammo For Old Wpn: ($W_{fn} < W_{fo}$) $$TC = W_{fo} Y_{bt} A_p + Y_t A_p \left(W_{fo} - \frac{W_{fn}}{2}\right) + Y_{at} A_p \left(W_{fo} - W_{fn}\right) + W_{fo} A_w \quad (5)$$

Ammo For New Wpn: (Comp Phase-Out, $W_{fn} \geq W_{po}$) $$TC = W_{fo} A_p \left(Y_{bt} + \frac{Y_t}{2}\right) + W_{fo} A_w \quad (6)$$

Nomenclature:

TC = Total cost to the Government from FY67 through FY80.

W_p = Total number of weapons procured. When W_p for new and old (i.e., existing) weapons appear in the same equation, W_{pn} and W_{po} are used to distinguish between them.

C_a & C_m = Costs to acquire and costs to maintain a weapon in the field each year respectively.

C_d = Research and development costs for new hardware which have not been included in the hardware costs.

C_f = Facilities costs for new ammunition which have not been included in the unit cartridge costs used in this study.

Y_t = Total number of transition years. That is, the number of years required to phase-in and/or phase-out the old weapon.

Y_{bt} & Y_{at} = Total number of years under consideration before and after the transition period respectively.

W_f = Total number of weapons fielded on which ammunition requirements are based. When W_f for new and old (i.e., existing) weapons appear in the same equation, W_{fo} and W_{fn} are used to distinguish between them.

A_p = Worldwide average cost of ammunition used per weapon for peacetime training (in \$/wpn/yr). $A_p = \sum (P_aU)_x + (P_aU)_y + (P_aU)_z + \text{-----}$. That is, ammunition cost/wpn/yr is the sum of the products of the peacetime allowance rates (P_a in rds/wpn/yr) multiplied by the unit cartridge costs (U in dollars) for each different type (x, y, z, etc.) of cartridge used.

A_w = Worldwide average cost of ammunition used per weapon for the first 6 months of wartime (in \$/wpn). $A_w = 4.68 \left[(D_sU)_x + (D_sU)_y + (D_sU)_z + \text{-----}\right]$

Where: D_s = Wartime day-of-supply ammunition use rates (in rds/wpn. mo. for 100% usage.)

U = Unit cartridge cost in dollars.

x, y and z refer to different types of cartridges such as ball, tracer, blank or 4 to 1 linked ammunition.

The constant 4.68 assumes 10% of weapons are distributed.

4. (U) Calculation of Weapon System Costs. The equations and data immediately preceding this section were used to calculate the following costs for each of the same twenty different weapons systems considered in Annex D: (all costs are for the FY67-80 period)

a. Costs to acquire and maintain various quantities of new weapons.

b. Total costs to supply each of these new weapon quantities with ammunition for peacetime training and for six months of war reserves.

c. When applicable, costs to maintain the existing weapon system until (and in line with the degree to which) it is replaced by the new system.

d. Total ammunition costs for existing weapons while they still remain in the system. This also includes six months of war reserves.

e. Grand total costs for both new and existing weapons and ammunition for each quantity of new weapons considered in "a." above.

The equations and input data were programed for computer operation. The computerized cost data inputs and outputs are presented in tabular form and the output cost data are presented in graphical form in Appendix 1 for each of the twenty weapons considered. The computer program is presented in Appendix 2.

In general, these data are in exceptionally good agreement with the corresponding costs presented in Annex D. Some errors have been detected in the Annex D data and have been or are being corrected. These discrepancies were in the cost of ammunition for existing weapons only and no errors were detected in the cost data presented in Annex D for new weapons and ammunition. The omission of six months of war reserve ammunition in a few of the figures presented in Annex D account for the remaining large differences between the two sets of costs data.

The graphical data in Appendix 1, this annex, are presented to facilitate interpolation between data points and computerization of the equations will facilitate the calculation of new cost data for any variation of the parameters desired.

5. (U) Parameter Variations and Sensitivity Analysis. Analysis of the data shown in the table below indicates that ammunition costs represent more than 75% of total system costs for total Army rifle replacement with [redacted] rifle for the FY67-80 period considered in the study. It is thus quite evident that ammunition usage rates as well as unit cartridge costs (including packaging) are by far the most important of the cost parameters.

Costs to Acquire, Maintain and Support Total Army Quantity of Rifles (FY67-80 Including 6 mos War Reserves)

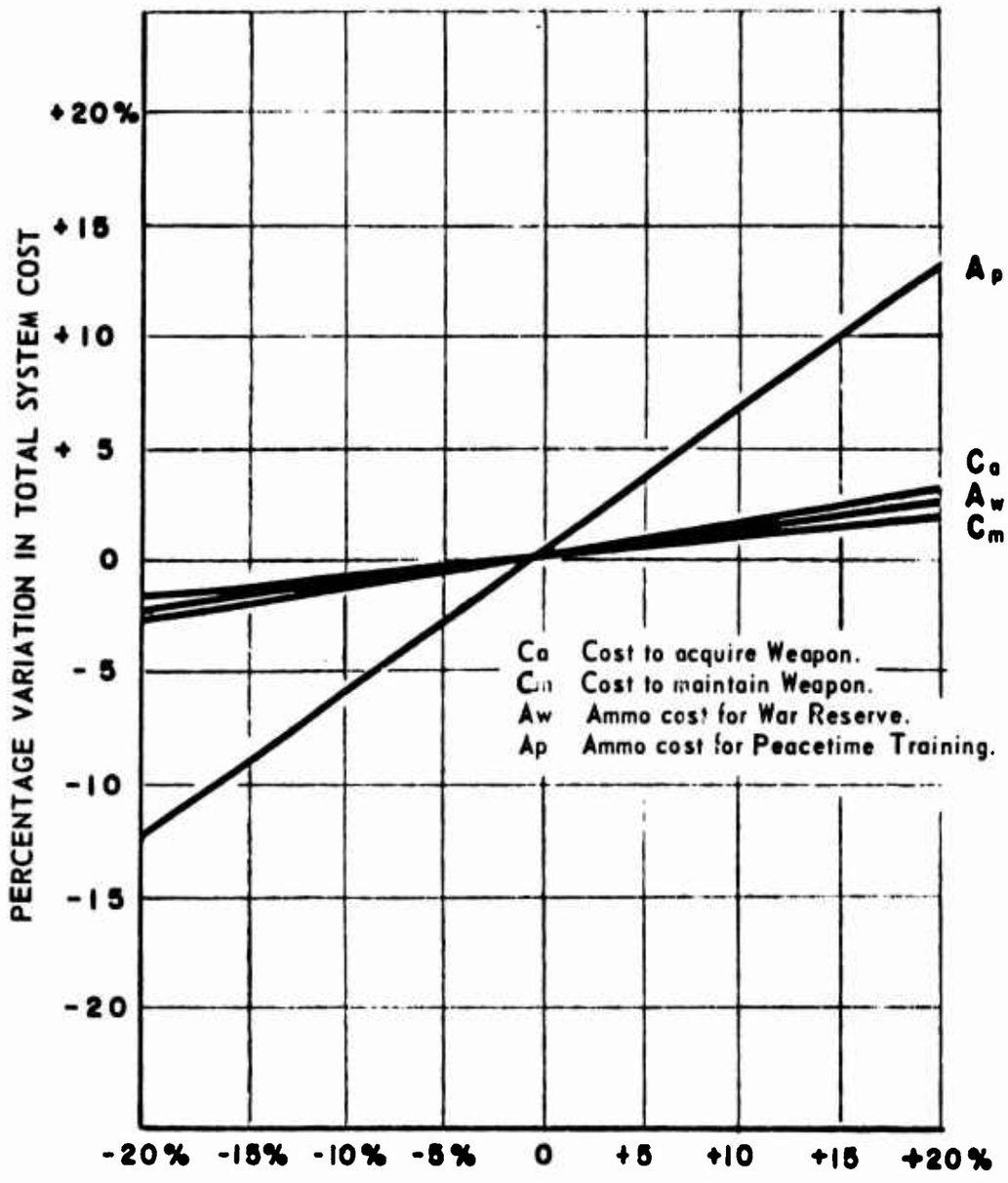
Description of Costs	Parameters	Costs
Weapon Acquisition	$W_I C_a$	$204,500,000
Weapon Maintenance	$.6\ W_p C_m Y$	136,900,000
Ammo for War Reserve	$W_f A_w$	191,710,000
Ammo for Facilities	C_f	8,000,000
Ammo for Peacetime	$W_f A_p Y$	939,180,000
	TOTAL	$1,480,290,000

Figure 1, which shows the sensitivity of total system cost to variations in each of the four principal cost parameters A_p, A_w, C_a and C_m, dramatically illustrates that the total cost is much more sensitive to variations in A_p (i.e., ammunition cost for peacetime training in $/wpn/yr) than it is to any of the other three cost parameters. Since A_p consists essentially of the product of P_a (i.e., peacetime training ammunition usage rate in rds/wpn/yr) and U (unit cartridge cost), one can say that from a total cost point of view, these latter two cost factors are the most important.

Although the data shown in Figure 1 pertain to a specific weapon system, the conclusions regarding the extreme importance of certain cost parameters are quite general for any of the small arms weapons systems considered in this study and are more particularly true for machineguns as a result of their higher rates of ammunition usage.

FIG 1

SENSITIVITY OF TOTAL OF RIFLE SYSTEM
COST TO VARIATIONS IN COST PARAMETER VALUES



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Having arrived at the conclusion stated above, it is now possible to illustrate the manner in which one might analyze the significance of differences in total costs for the principal competing weapon systems in relation to the uncertainties associated with the specific values chosen for the important cost parameters.

Figure 2 portrays the variation of total system cost as a function of simultaneous variations in unit cartridge costs (U) and peacetime ammunition allowance rate (P_a) for the "A", "B" AND "C" rifles. This diagram considers the maximum possible variations in U and P_a for each system to be $\pm$ 20%. This, in turn, means a maximum possible variation of $\pm$ 20% in A_w and of + 44% and - 36% in A_p.

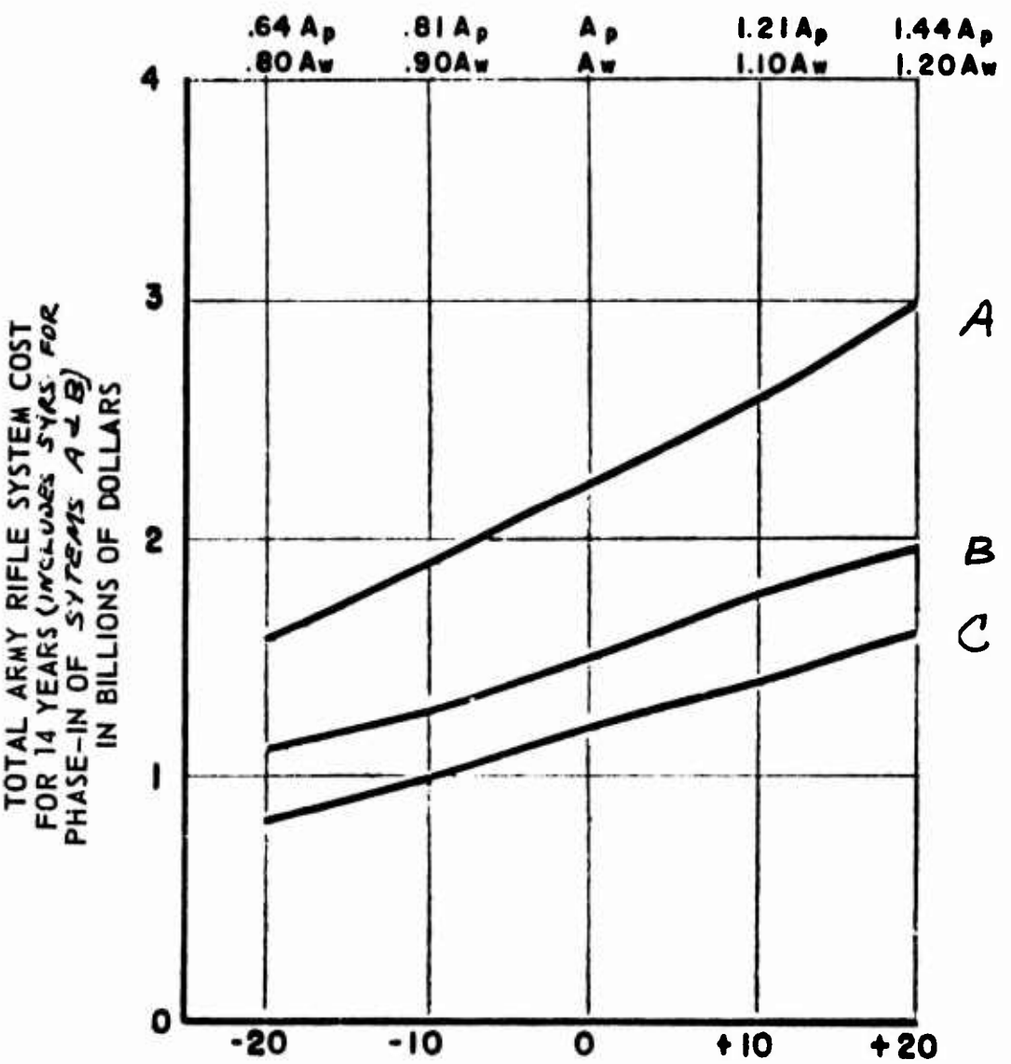
Many conclusions can be drawn from the curves shown in Figure 2. Most importantly, it is noted that there is some overlapping of total costs of the various rifle systems. For the variations in P_a and U considered, A costs vary from 1.56 to 3.0 billions of dollars, whereas B rifle costs vary between 1.1 and 1.93 billions of dollars. These data also show that for the particular values of P_a and U used in this study, total costs for A are approximately 50% higher than for the B rifle (i.e., 2.21 vs 1.48 billions). However, purely from a hardware cost point of view, the A rifle could be competitive with either the B or B' rifles if the values of P_a and U for the A were both

overestimated by approximately 8 to 20% while, for the B rifles, these parameters were underestimated by approximately 2 to 18%. Thus, the significance of the difference between the two rifle system costs would depend upon one's judgment regarding the possible degree of uncertainty of the specific values used in the cost study.

6. Conclusions and Recommendations. In view of the extreme importance of the various ammunition usage rates and unit cartridge costs to total system costs, it is recommended that further study be made of the specific values used in these calculations if total system costs are to be an important criteria in the overall SAWS study. If necessary, these ammunition parameters should be refined and new systems costs determined on the basis of the revised parameter values.

The required calculations can be completed at the Headquarters, U.S. Army Weapons Command within a very short time after the revised data are received since comparison of the systems costs as presented in Annex D and E validate the computerized methodology.

FIG. 2
VARIATION IN TOTAL RIFLE SYSTEM COSTS
WITH VARIATIONS IN IMPORTANT AMMUNITION
PARAMETERS – Pa AND U
(Considers 14 years for each system, for comparative purposes spans
time frame FY 71–84)



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Appendix 1 - Nomenclature

For Data Sheets:

CMN - Cost to maintain new weapon each year.

CAN - Cost to acquire new weapon.

CFN - Cost for ammunition manufacturing facilities for new weapons.

CD - Cost for development of weapon system. (NOTE: Latter 2 costs are those which are not already included in hardware costs.)

WPO - Total (maximum) number of old (o.e., existing) weapons in the inventory.

WFO - Total (maximum) number of old weapons in the field or in hands of troops.

CMO - Cost to maintain old weapon each year.

APO - Worldwide average cost rate of ammunition usage for old weapon in peacetime (in $/wpn/yr).

AWO - Worldwide average cost rate of ammunition usage for old weapon for first six months of war (in $/wpn).

YT - Length of transition period in years (i.e., number of years required to phase in the new weapon and phase-out the old).

YBT & YAT - Number of years to be considered before transition period and after the transition period, respectively.

WPN - Total number of new weapons to be produced for Army inventory.

WFN - Total number of new weapons to be fielded (i.e., in the hands of troops).

APN - Worldwide average cost rate of ammunition usage for new weapon in peacetime (in $/wpn/yr).

AWN - Worldwide average cost rate of ammunition usage for new weapon for first six months of war (in $/wpn).

Appendix 1 - Nomenclature (Cont'd)

For Charts:

NW - New weapon.

OW - Old (existing weapon.

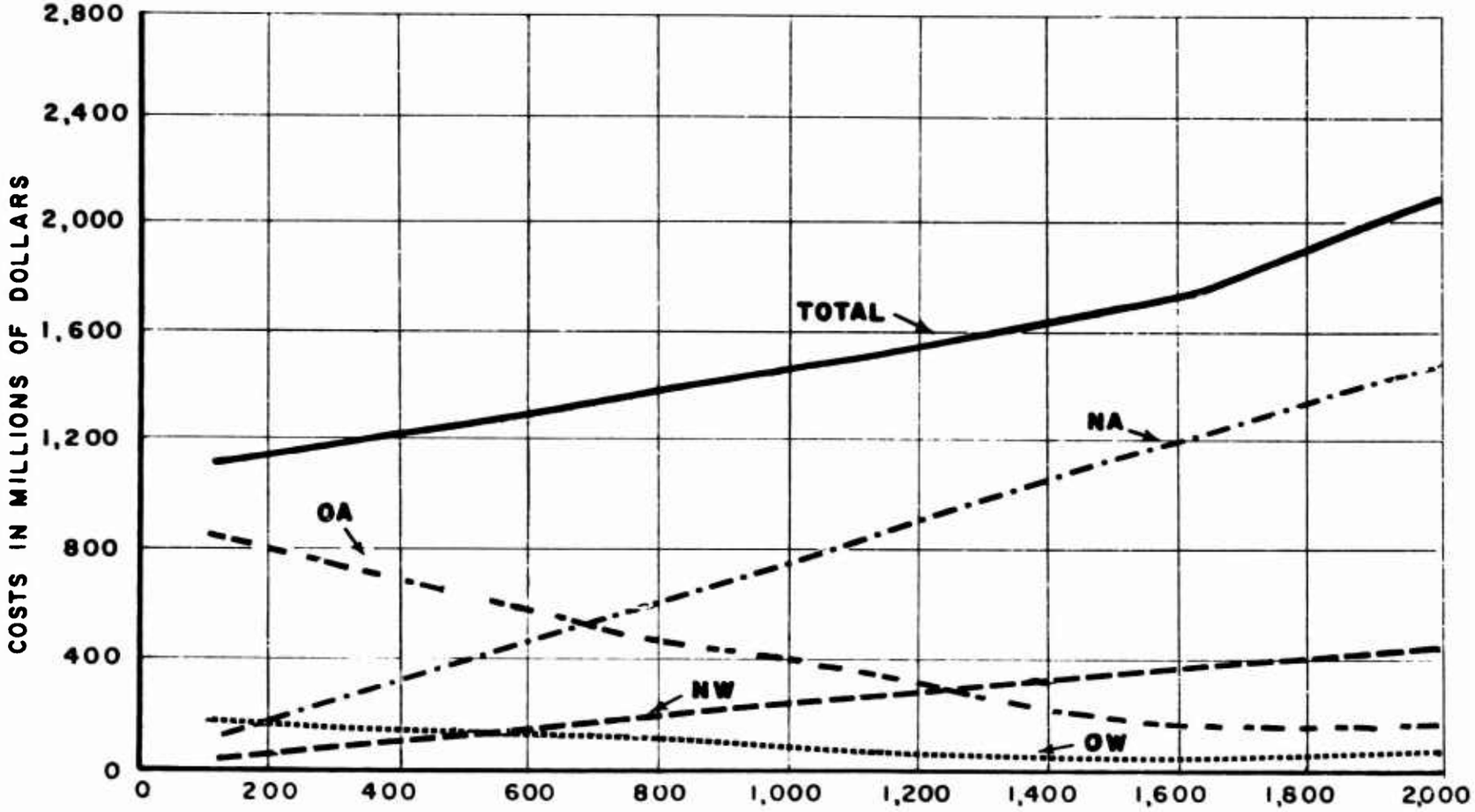
NA - New ammunition (i.e., ammo for new weapons).

OA - Old ammunition (i.e., ammo for old weapons).

TOTAL - Total costs for all weapons and ammunition.

CASE I. RIFLE B -5.56 mm

COSTS VS. QUANTITIES



REV 1

WEAPON QUANTITIES IN THOUSANDS

EXISTING RIFLES (M1-M14-M16)

WPO UNITS	WFO UNITS	CMO DOLLARS	APO $/M/YR	AMO $/M/YR/2
	1199235.	13.00	55.00	0.00

REPLACES M14/M1 CASE 1

CD,$	YBT,YRS
0.00	0.00

VARIABLES

WPN UNITS	CMN DOLLARS	CAN DOLLARS	CFN DOLLARS	YT YEARS	YAT YEARS	WFN UNITS	APN $/M/YR	AMN $/M/YR/2
100000.	14.21	153.22	0.00	2.80	11.20	60876.	67.00	159.86
	14.00	150.18	0.00	3.00	11.00	135019.	67.00	159.86
200000.	13.90	148.73	0.00	3.10	10.90	180904.	67.00	159.86
400000.	13.27	139.76	0.00	3.70	10.30	521559.	67.00	159.86
500000.	12.95	135.28	0.00	4.00	10.00	601887.	67.00	159.86
600000.	12.95	135.05	770395.99	4.10	9.90	673871.	67.11	159.86
800000.	12.94	134.60	2311187.98	4.29	9.71	832240.	67.32	159.86
1000000.	12.93	134.15	3851979.96	4.48	9.52	985808.	67.53	159.86
1200000.	12.92	133.70	5392771.95	4.67	9.33	939376.	67.74	159.86
1400000.	12.91	133.25	6933563.94	4.87	9.13	1092948.	67.95	159.86
	12.90	132.94	8000000.00	5.00	9.00	1199235.	68.10	159.86
1600000.	12.90	132.80	8474355.91	5.06	8.94	1246513.	68.17	159.86
1800000.	12.89	132.35	10015147.90	5.25	8.75	1400082.	68.38	159.86
2000000.	12.88	131.90	11555939.90	5.44	8.56	1553650.	68.59	159.86

REV. 1

REPLACES M14/M1 CASE 1

COSTS, MILLIONS OF DOLLARS

WPNS, UNITS	NEW WEAPON	OLD WEAPON	NEW AMMO	OLD AMMO	TOT SYSTEM
100000.	26.070	156.167	80.916	867.563	1132.713
	42.813	151.638	134.663	830.585	1159.699
200000.	80.513	148.572	159.956	813.219	1172.269
400000.	94.591	130.067	313.181	708.520	1246.379
500000.	114.260	121.196	387.363	658.166	1280.985
600000.	136.732	112.062	461.204	606.756	1318.753
800000.	181.295	94.018	607.965	511.156	1394.433
1000000.	225.353	76.274	753.660	415.183	1470.289
1200000.	268.905	58.831	897.731	320.836	1546.304
1400000.	311.954	41.688	1040.699	226.117	1622.458
	341.454	41.999	1138.891	184.895	1687.238
1600000.	354.498	42.355	1182.365	180.850	1760.068
1800000.	396.540	43.510	1322.710	173.202	1935.962
2000000.	438.079	44.666	1461.716	174.554	2124.015

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13. ABSTRACT

This report is a compilation of five automated mathematical life cycle cost models for small arms weapons and combat vehicles. Each of these methodologies consist of a mathematical model and nomenclature lists. Some of the models include samples of computer printouts, input data, resultant costs, derivations of pertinent relationships as well as some of the FORTRAN computer programs employed, and other explanatory material.

The first model presented is the WECOM Combat Vehicle Life Cycle Cost Model. This model is the most highly developed of the five and is described and presented in the most comprehensive manner. This methodology, which develops costs according to two different schemes of categorization, simultaneously, consists of some 100 equations and approximately 110 elements or sets of input data, schedules and cost factors.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Automated Cost Model						
Life Cycle Costs						
Weapon System Costs						
Combat Vehicle Costs						
Small Arms Weapons Costs						
Mathematical Models						